Going Round in Circles

Developing a new approach to waste policy following Brexit

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Policy Exchange

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The views expressed in this report are those of Policy Exchange.

Executive Summary

This report considers the future of waste policy following Brexit. It provides a summary and critique of European and UK policies towards waste and resource management, highlighting both the successes to date and the weaknesses.

Successive European Directives concerning waste and recycling have led to a step change in the way that we manage waste in the UK – with less waste going to landfill, and more being recycled. However, it is becoming less and less clear what European waste policies are trying to achieve: the objectives are muddled, and the proposed recycling targets are badly designed. The European Commission's own analysis shows that adopting the policies they are now proposing would place additional costs on UK businesses and households.

Brexit offers an opportunity for the UK to reconsider waste policy in the light of its new competence in this area, and identify the best way forward. We recommend that rather than adopting the EU's proposed "Circular Economy package", the UK Government should develop its own set of policies concerning waste and resources. This should be reframed around a much clearer set of objectives and policies, aimed at improving the UK's resource productivity whilst minimising the environmental impacts associated with waste.

Context

There are many areas of policy in which the UK has ceded some or all of its control to the EU. The EU and Member States have shared competence over environmental policies such as waste management. The vote to leave the EU has opened up questions about the future of environmental policy in the UK for the first time in decades – since the UK will regain full control of policy in this area.

The high level framework for waste policy is defined under a number of European Directives such as the Waste Framework Directive (2008) and the Landfill Directive (1999) which have been transposed into UK legislation. The Waste Framework Directive defines what we mean by 'waste', and the overall approach towards waste management. In theory at least, the approach is to move waste up the "waste hierarchy" – promoting waste prevention, reuse, and recycling; and minimising recovery and disposal/landfilling. The Waste Framework Directive sets targets for all Member States to achieve 50% recycling of municipal waste and 70% recycling of construction waste by 2020.

Since 2014, the European Commission has been developing the "Circular Economy" package of additional proposals concerning waste. The overall idea of the plan is to create a more "circular" economy in which resources are recirculated within the economy. The draft Circular Economy Action Plan included ambitious targets to increase municipal recycling to 65% by 2030, and limit landfilling to 10% of municipal waste. The European Parliament recently suggested increasing the recycling target further to 70%, and tightening the limit on landfilling to 5% of waste by 2030.

Current State of UK Waste Management

These policies have had a transformational impact on the way that we manage resources and waste in the UK:

- The UK is using fewer and fewer resources. Total Domestic Material Consumption decreased from 740 million tonnes in 2003 to 590 million tonnes in 2013. The UK produces 63% more economic output per kilogram of materials consumed than it did in 2000. The UK is far more productive in the use of resources than the European average.
- Total waste arisings (from all sectors including households) reduced by 16% over the period 2004-14, from around 300 million tonnes per annum to around 250 million tonnes per annum. There was a reduction in waste arisings of 76% in the manufacturing sector, and 60% in the services sector over this period. Conversely, construction waste increased by 21% and is now by far the largest source of waste (120 million tonnes per annum).
- The total amount of municipal waste[1] in England fell slightly from 28 million tonnes in 2000/01, to 26 million tonnes in 2015/16. This represents a 16% reduction in waste per household, given the growth in household numbers over this period.
- The way in which municipal waste is treated has changed dramatically. The municipal recycling rate in England increased from 12% in 2000/01, to 43% in 2014/15. However, this is still some way short of the European target to recycle 50% of municipal waste by 2020. The proportion of municipal waste sent to landfill fell dramatically from 80% in 2000/01, to less than 20% in 2014/15.
- Progress has also been made in the construction and demolition sector, where 90% of waste is recycled or recovered – well ahead of the European target of 70% by 2020.
- The UK now exports large quantities of waste and scrap materials overseas. In 2016, the UK had net exports of scrap materials worth £3.1 billion.
- However, there is also a burgeoning market for companies exporting residual waste overseas, where it is burned to produce energy. This has cost the UK over £900 million in gate fees since 2011 (including £280 million in 2016 alone).

These changes have led to a significant improvement in the environmental impact of waste management activities in the UK. For example, direct greenhouse gas emissions from waste management have reduced by around 75% since 1990. Emissions of dioxins from waste incinerators fell by more than 99% since 1990, as did the emissions of several heavy metals (e.g. Arsenic, Cadmium, Lead, and Mercury). Evidence gathered for this report shows that energy from waste facilities are operating well within the Emissions Limit Values for regulated pollutants such as dust, Carbon Monoxide, and Sulphur Dioxide; despite these emission limits being tighter than for any other thermal process regulated in the EU.

1 'Municipal waste' includes all waste collected by Local Authorities – including household waste and some non-household waste.

Critique of European Waste Policies

Despite the successes noted above, there are a number of significant weaknesses in the European approach towards waste:

- **Objectives are unclear:** The objectives of European waste policy have evolved over time, and have now become very unclear. This is particularly true of the proposed Circular Economy package, which appears to be justified as an end in itself, rather than a means to achieving a particular set of economic, environmental or social outcomes. The notion of a 'circular economy' is very open to interpretation – for example, it is unclear whether the EU is trying to make the economy more circular at Member State, European or global level.
- **Targets prescribe the means not the ends:** The targets set under the Waste Framework Directive and Circular Economy package prescribe the *methods* of waste treatment, rather than environmental outcomes. There are a number of serious side-effects to the use of weight-based recycling targets, which in some cases may be leading to perverse outcomes.
- **Fails to reflect UK context:** Cost benefit analysis shows that the targets proposed by the European Commission under the Circular Economy package represent a poor choice from the UK's perspective. They would impose an additional cost on UK businesses of £1.9 billion (in the period 2015-35). The Commission's own analysis shows that it has failed to select the optimal set of policies either at EU or UK level.
- **Ignores the fundamentals:** European waste policies are focused on the achievement of ever higher levels of recycling, and fail to reflect the economic fundamentals. The economics of recycling have deteriorated in recent years due to the fall in commodity prices since the Great Recession. This has impacted on the value of secondary materials and the viability and profitability of recycling activity. It is difficult to see how the UK will achieve the even more ambitious recycling targets proposed by the EU without increasing the cost to businesses and households.
- **Poor data and definitions:** Waste policy suffers from some serious issues regarding definitions, measurement, and data quality. There is significant divergence within the UK and between European countries on how waste flows are defined and measured. Official recycling figures are likely to overstate the actual amount of recycling taking place, since they mask the amount of contamination in the materials handled by recycling firms. The data on non-municipal waste streams is generally very poor.

Developing a New Approach to Waste Policy

Given the shortcomings highlighted above, this report argues that the UK Government should not simply accept the Circular Economy package and transpose it into UK legislation. **Instead, following Brexit, the UK should define its own approach to waste and resource policy which better suits the UK context.** This needs to be reframed around a much clearer set of objectives, underpinned by a coherent set of targets and policies.

The overall aim of this policy framework should be to achieve a more sustainable pattern of resource use and waste management – economically, environmentally and socially. For too long, waste policy has been driven primarily by an environmental agenda, with a rather muddled set of overarching aims. It needs far greater clarity of purpose.

Equally, there is a sizeable opportunity for businesses to further improve their resource productivity, and in doing so improve their overall productivity and competitiveness. This potential is recognised in the Government's Industrial Strategy green paper, but needs to be considered further.

This report argues that Government should redefine its strategy and policies towards waste and resources, focusing on the following high level objectives:

- **Maximise resource productivity** by minimising resource use and maximising the value of materials through reuse, recycling and recovery. Improving resource productivity can significantly reduce costs to business, and thereby contribute towards the Government's emerging Industrial Strategy. Government should track the material consumption per unit of GDP – both at aggregate level for the UK economy, and for individual sectors.
- **Minimise environmental impacts** of resource use and waste management. Waste and resources policy should be consistent with and contribute towards the objectives defined in the Climate Change Act, the forthcoming Emissions Reduction Plan, and Defra's forthcoming 25 Year Plan for the Environment. **The Government should implement a carbon-based metric to monitor the environmental impact of waste activities at UK and Local Authority level, similar to that already used by London Boroughs.** Government should also refresh the 'waste hierarchy', based on analysis of the greenhouse gas impact of treatment options for individual waste streams.
- **Minimise the burden on society** by minimising the cost of municipal waste management (which cost a total of £3.5 billion in 2015 in England, or £130 per household) and ensuring a high level of consumer satisfaction.

Achieving this will require significant collaboration between Defra (which leads on waste and environment policy) and BEIS (which leads on industrial strategy, energy and climate change).

The report contains a number of detailed recommendations on how to better align policies with the objectives set out above:

Reduce, Reuse

- **Shift the emphasis of waste policy towards waste prevention and reuse. This needs to happen at all levels including Central Government and Local Government.**
- **Government should remove the barriers and positively encourage the reuse of goods and materials at Household Waste Recycling Centres (HWRCs) – either for resale or for distribution to local charities.**
- **Local Authorities should also do more to promote reuse opportunities within their local areas. This will ultimately reduce the amount they spend on waste collection, recycling and disposal.**
- **The UK Government should continue to engage with the EU on the development of product standards (such as the Eco-design Directive) both in the period until the UK leaves the EU, and beyond. The scope of Eco-design should be extended to consider how to improve product durability, reparability, and recyclability.**

- As part of the broader sector-based approach set out in the Industry Strategy green paper, Government and industry should work to improve resource productivity and reduce waste.
- The wider use of kite-marking should be explored as a way to communicate the advantages of better product design to the consumer.

Recycling

- Defra and DCLG should set a timetable for all Local Authorities in England to move to one of three standardised systems for the collection of waste and recycling (e.g. by 2025), simplifying the 400+ collection systems for waste and recycling across England.
- Local Authorities should use proactive marketing and 'nudges' to increase public awareness concerning waste and improve waste and recycling practices.
- Product manufacturers and retailers should work together with WRAP to define common standards for labelling of packaging to improve recycling behaviour.
- Government should reform the system of 'Packaging Recovery Notes' to remove distortions and put UK-based recyclers on an equal footing to overseas recyclers.
- Defra and WRAP should consider how to support the development of markets for secondary materials, building on the highly-successful National Industrial Symbiosis Programme which ran until 2013.
- Government should foster innovation in the recycling and reuse of goods and materials. This should include re-establishing and streamlining the process for obtaining 'End of Waste' status for products manufactured from waste.

(Energy) Recovery

- Government should prioritise energy from waste towards high efficiency technologies (producing 'green gas' or Combined Heat and Power). These technologies offer far higher levels of efficiency than electricity-only incineration facilities, and could play an important role in decarbonising heating and transport. Existing subsidy support schemes need to be amended to reflect this shift of focus.
- The Government needs to provide clarity about the future of the Renewable Heat Incentive scheme beyond 2020/21.
- The Government and waste management industry should work together to increase transparency about the efficiency and environmental impact of energy from waste facilities.
- The Government and the waste industry should explore the creation of community benefit schemes for communities which host energy from waste facilities.
- Government should tighten the definition of "Refuse Derived Fuel", such that operators are required to extract all economically-recoverable materials prior to export of materials for energy recovery abroad.

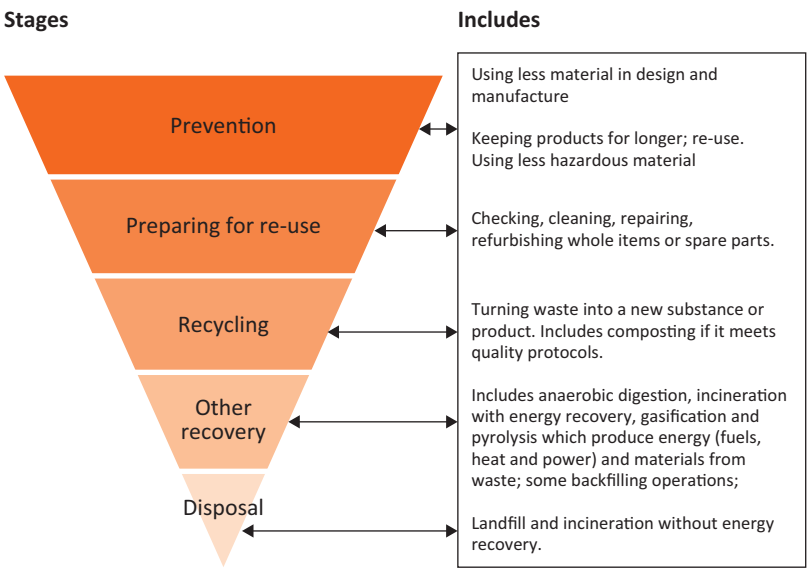
1 Introduction

Policy Context

Policy and regulation concerning waste management in the UK is largely derived from the EU, which has shared competence with Member States on waste and other environmental policies. The most notable piece of legislation is the Waste Framework Directive (2008/98/EC), which was transposed under the Waste (England and Wales) Regulations 2011.[2]

The Waste Framework Directive provides a basic definition of what is considered waste from the perspective of EU law, namely "… any substance or object which the holder discards or intends or is required to discard."[3] It also defines an overarching 'waste management hierarchy' (Figure 1.1), which underpins much of EU and UK waste policy thinking. This suggests that the first priority should be to *prevent* waste from arising in the first place, for example through improvements in design, or making products more durable. The waste hierarchy then moves down through an inverse pyramid, suggesting that Member States should encourage the reuse of products and materials, *recycling* back into new materials, and *(energy) recovery*, before finally considering *disposal*.[4] Materials are considered 'waste' regardless of the final treatment route.

Figure 1.1: Waste Management Hierarchy[5]



2 European Commission (2008) 'Directive 2008/98/EC', *Official Journal of the European Union*

3 Ibid, p.312/9. N.B. Supplementary judgements on what constitutes 'waste' are available from DEFRA (2009) *The Definition of Waste: Summary of European Court of Justice Judgements*

4 European Commission (2016) *Directive 2008/98/EC on waste (Waste Framework Directive).* EU Commission

5 DEFRA (2013) *Waste Management Plan for England*

The Waste Framework Directive also introduces the following key concepts in respect of waste policy:

- **Producer pays principle:** this is the idea that polluters should bear the cost of the environmental damage they create. This concept pre-existed the Waste Framework Directive but was made an explicit part of EU waste policy in Article 14 of the Waste Framework Directive, where it states that "the costs of waste management shall be borne by the original waste producer or by the current or previous waste holders."[6] The Directive allows individual Member States to determine whether the costs of waste management should be borne "partly or wholly by the producer of the product from which the waste came", and also suggests that "the distributors of such product may share these costs."
- **Extended producer responsibility:** this is the idea that product producers should bear a degree of responsibility for what happens to products during their lifecycle. The Waste Framework Directive states that producers should be required to "take into full account and facilitate the efficient use of resources during their whole life-cycle including their repair, reuse, dis-assembly and recycling".[7] Under the Directive, Members States "may take appropriate steps to encourage the design of products to reduce their environmental impacts and the generation of waste".

Because EU Directives are binding only in terms of their outcomes, Member States have largely retained the flexibility to decide how to achieve the broad objectives set out in the Waste Framework Directive. The waste hierarchy, polluter-pays principle, and extended producer responsibility are intended to serve as guidelines for domestic policy, rather than setting strict legal requirements. This is important where exceptions to the waste hierarchy become apparent. For example, research carried out by Defra suggests that Anaerobic Digestion of organic waste (which is classed as 'recovery') is often preferable to recycling or composting, to maximise the use of the available resources.[8]

Prevention, Reuse and Recycling

The Waste Framework Directive sets a number of targets which Member States are required to adhere to, as follows:

- A target for a minimum of 50% (by weight) of municipal waste to be recycled or prepared for reuse by 2020.[9] The UK is still some way short of achieving this target, as discussed in Chapter 2, with the headline recycling rate currently standing at less than 45%.
- A target for a minimum of 70% (by weight) of construction and demolition waste to be reused, recycled, or recovered by 2020. This target has already been significantly exceeded in the UK, with 89.9% of construction and demolition waste recovered in the UK in 2014.[10]

Member States are required to adopt separate collections of waste steams such as paper, glass, metals, and plastic where this is "technically, environmentally and economically practicable."[11] This provision was enacted in UK law in 2012, and

6 Ibid. p.312/14

7 European Commission (2008) 'Directive 2008/98/EC', *Official Journal of the European Union*

8 Defra, Wrap & Environment Agency (2011) *Applying the Waste Hierarchy: evidence summary*

9 European Commission (2008) 'Directive 2008/98/EC', *Official Journal of the European Union*

10 Defra (2016) *UK Statistics on Waste*

11 Ibid. p.312/6

came into force in early 2015.[12] As discussed in Chapter 4, there are a great many different systems for waste collection across the UK, which vary in terms of which materials are separately collected.

The extended producer responsibility and polluter pays principles have been implemented in UK waste policy under the Producer Responsibility Obligations (Packaging Waste) Regulations 2007 (which pre-dated the 2008 EU Waste Framework Directive).[13] This places an obligation on manufacturers and retailers to recycle a set proportion of the materials they use (Table 1.1). This obligation falls across a number of different parties, including the manufacturer of the raw material, the manufacturer of the packaging, the packer/filler, and the retailer. For every tonne of packaging waste recycled, a tradable 'Packaging Recovery Note' (or PRN) is issued, which companies can then trade in order to meet their obligations.

Table 1.1: Targets under the UK Producer Responsibility Obligations[14]

	2014	2015	2016	2017
Paper	70%	70%	70%	70%
Glass	75%	76%	77%	77%
Aluminium	46%	49%	52%	55%
Steel	73%	74%	75%	76%
Plastic	42%	47%	52%	57%
Wood	22%	22%	22%	22%
Overall Target (Recycling)	70%	71%	72%	73%
Overall Target (Recycling + Recovery)	76%	77%	78%	79%

(Energy) Recovery

As well as recycling, the Waste Framework Directive also sets out a number of objectives and regulations concerning the 'recovery' of waste.[15] It clarifies the distinction between recovery and disposal, based on the environmental impact of different treatment routes. Recovery includes a number of different treatment options including:

- **Incineration:** waste can be incinerated to produce power (some incinerators also capture heat). A variety of wastes can be used as feedstock including mixed residual waste and more specific waste streams such as wood. The incineration of waste may be classed as recovery provided that the facility meets specific energy efficiency standards (classed as an "R1" facility).[16] Incinerators that fail to meet these efficiency standards are classed as waste disposal ("D10" facility) even if they generate some energy. Incinerators produce some ash, which is typically either disposed of in landfill, or used as a form of aggregate.
- **Anaerobic Digestion:** organic waste such as food waste and green waste can be treated in an Anaerobic Digestion facility, producing biogas and compost. This biogas can either be burned on site to produce power (and possibly also heat), or upgraded to biomethane and injected into the gas grid.

12 UK Government (2012) *The Waste (England and Wales) (Amendment) Regulations 2012*

13 UK Government (2007) *The Producer Responsibility Obligations (Packaging Waste) Regulations 2007*

14 Lets Recycle (2017) *Packaging Targets*

15 See Annex II of European Commission (2008) 'Directive 2008/98/EC', *Official Journal of the European Union*

16 Defra (2014) *Energy from waste: A guide to the debate (revised edition)*

- **Advanced Conversion Technologies (or Advanced Thermal Treatment):** this covers a number of advanced technologies such as Gasification and Pyrolysis, which can be used to turn waste into synthetic natural gas (often referred to as BioSNG). Similar to Incineration, these technologies can use a range of waste feedstocks. As with Anaerobic Digestion, the biogas produced through this process can either be burned to produce electricity and heat, or upgraded and injected into the gas grid. Gasification and Pyrolysis plants produce some residues, which are typically either incinerated or landfilled.

The distinction between recovery and disposal has implications for environmental permitting in the UK. Higher efficiency energy recovery facilities are more likely to gain planning and environmental permissions than low efficiency incinerators classed as waste disposal. It also has implications for the shipment of waste. EU law permits the export of waste across national borders for recovery, but specifically prohibits the export of waste for disposal. Any overseas energy from waste facility which receives waste from the UK must meet R1 standards and must also be situated in an OECD country.

Furthermore, the export of mixed municipal waste is not permitted unless it has undergone some degree of pre-treatment. At the most basic level, the pre-treatment process involves stripping out metals for recycling, and shredding and baling the waste for shipment (in which case it is referred to as 'Refuse-Derived Fuel'). Alternatively, waste can go through a more extensive treatment process, to manufacture a Solid Recovered Fuel (SRF) in line with specific standards (e.g. for calorific value, moisture content, sulphur content etc). Within these guidelines, a very competitive market has emerged in the UK for the export of waste to continental Europe for energy recovery, as discussed further in Chapter 2.

Energy from waste is influenced by energy policy as well as waste policy, which is determined both at UK and EU level. Energy policy is framed around the 'energy trilemma', or three objectives of affordability, sustainability, and security of supply. These objectives frequently come into conflict, for example our report, *The Customer is Always Right*, showed that policies to boost the deployment of renewables have contributed to a significant increase in household energy bills.[17]

At EU level, targets have been set under the 2020 Climate and Energy Package, as follows:

- 20% reduction in greenhouse gas emissions (compared to 1990 levels).
- 20% of total EU energy from renewables (targets vary across Member States, with a target of 15% by 2020 in the UK).
- 20% improvement in energy efficiency.

In addition to this, the UK has made a unilateral commitment under the Climate Change Act to reduce greenhouse gas emissions by 80% by 2050, compared to 1990 levels. In order to make progress towards this, the UK Government has also set a number of five-yearly 'carbon budgets', which currently cover the period until 2032.

A number of subsidy schemes have been created to support the deployment of low carbon technologies (including Energy from Waste) as follows:

17 Howard, R. (2015) *The Customer is Always Right*. Policy Exchange

- The **Contract for Difference** supports large scale projects (over 5MW) producing low carbon electricity. All technologies are required to bid in an auction to receive financial support. There are two separate auctions for "more established technologies" (which includes Incineration with heat recovery) and "less established technologies" (which includes Anaerobic Digestion and Gasification). The first CfD auction round took place in 2014, in which the winning bids included three Gasification projects (a total of 62 MWs) and two Incinerators (total of 95MWs), plus a much larger number of wind and solar projects. The next CfD auction for "less established technologies" will take place in Spring 2017, with an overall annual budget of £290 million. It is unclear when the next auction for "more established technologies" such as Incineration with CHP will take place, if at all.
- The **Renewable Heat Incentive** offers subsidies for Anaerobic Digestion, both for the injection of biomethane into the gas grid, and for heat generated through the combustion of biogas.
- The **small-scale Feed in Tariff** offers support for Anaerobic Digestion where it is used to produce power.

Disposal

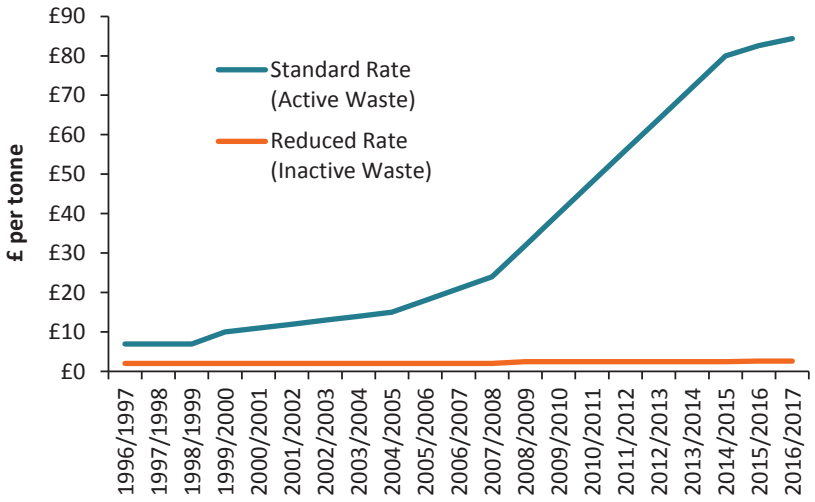
Alongside policies to promote recycling and reuse, the EU has also taken action under the Landfill Directive (1999/31/EC) both to reduce the amount of waste sent to landfill, and to reduce the environmental impact of landfill operations. The Directive defines different types of landfill waste (hazardous, non-hazardous, and inert) and prohibits liquid, flammable, explosive or oxidising wastes, clinical waste or used tyres from entering landfill.[18]

In addition, the Landfill Directive sets targets for the amount of biodegradable municipal waste sent to landfill to reduce by 50% by 2013, and 65% by 2020 (compared to 1995 levels). Under the Directive, Member States retain a significant amount of latitude as to how they achieve these objectives. The UK is one of a number of countries which uses a landfill tax as a policy lever to reduce the amount of waste going to landfill. The UK Landfill Tax was originally implemented in 1996 under the Conservative Government, at £7 per tonne for standard or active waste, and £2 per tonne for inactive or inert waste. The Landfill Tax has been increased over time to the current levels of £84.40 per tonne and £2.65 per tonne for standard and inert waste respectively (Figure 1.2). From 2010 to 2014 the rate for standard waste increased by £8 per year, and since 2014 it has increased in line with RPI inflation.[19]

18 European Commission (1999) 'Council Directive 1999/31/EC', *Official Journal of the European Union*. Note: Used tyres can be accepted and landfills, provided they are used as engineering material.

19 IFS (2015) *Landfill Tax Data*

Figure 1.2: UK Landfill Tax



In 2004, the Landfill Tax was supplemented with a Landfill Allowance Trading Scheme (LATS) to reduce the amount of biodegradable municipal waste going to landfill. Under the scheme, waste disposal authorities were allocated allowances equal to the UK's overall landfill reduction targets, and were then allowed to trade these allowances in order to meet their landfill reduction obligations. The scheme was wound up in 2012/13, following a Defra review of waste policy in 2011.

Waste Electrical and Electronic Equipment (WEEE)

The EU has defined 'waste of electrical and electronic equipment' (WEEE) as a special category of waste. This includes electronic equipment such as televisions, mobile phones and white goods. WEEE waste contains a mixture of materials – generally plastics and metals, but also some hazardous and reactive materials, and rare metals. The first EU WEEE Directive (2002/96/EC) required the creation of collection schemes where consumers could dispose of WEEE waste free of charge. These provisions were expanded in 2012 (Directive 2012/19/EU) with a target for a minimum 45% collection rate of WEEE waste, based on the average weight of electrical and electronic waste placed on the market in the three preceding years.[20] The target collection rate is set to rise to 65% in 2019. The 2012 Directive contains additional product regulations that restrict the use of hazardous substances such as lead, mercury, cadmium in electrical equipment.[21]

Circular Economy Package

The EU is currently developing a new set of waste policies, known as the "Circular Economy Package". The term "Circular Economy" refers to the concept of moving from a "linear" model of consumption (in which we take materials, use them to make goods, and then dispose of them) to a more "circular" model in which materials and goods are reused, recycled and recirculated within the economy. Circular Economy thinking has been championed by a number of organisations, such as the Ellen MacArthur Foundation, and is associated with a number of similar

20 European Commission (2012) 'Directive 2012/19/EU', *Official Journal of the European Union*

21 European Commission (2016) 'Waste Electrical & Electronic Equipment (WEEE)', *EU Commission Website*

concepts such as "cradle to cradle" design, and "industrial ecology". In moving to a circular economy, the aim is to conserve natural resources by getting the maximum use out of them. It requires whole resource systems to change, altering business models such that they are not predicated on waste, and purposefully design products so they are suitable for repair, reuse or remanufacture.

The European Commission is incorporating these principles into the way that it thinks about waste, and published an initial "Circular Economy Package" in July 2014. The European Commission consulted on revised proposals in Summer 2015, and the final Circular Economy package and Action Plan were adopted by the European Commission in December 2015.[22]

The Circular Economy package proposes a number of new targets for the recycling and reuse of waste, raising the ambition relative to the existing Waste Framework Directive (Table 1.2).

Table 1.2: Summary of Targets under the Proposed Circular Economy Package

	Waste Framework Directive	Circular Economy package	
Target Date	2020	2025	2030
Recycling and reuse of municipal waste	50%	60%	65%
Recycling of packaging waste		65%	75%
Landfill as a proportion of municipal waste		Maximum of 10%, plus ban on landfilling of separately collected waste	

Interestingly, these targets are slightly lower than what was originally proposed by the Commission in July 2014 (a 70% target for recycling/reuse of municipal waste in 2030). The European Parliament has recently proposed amendments to the Circular Economy Package, which would increase the municipal recycling target back up to 70% in 2030, and tighten the limit on landfilling to 5% of municipal waste.[23]

As well as setting the above targets, the Circular Economy package includes a wide-range of other legislative and advisory proposals including:

- changes to the Waste Framework Directive, Landfill Directive, Packaging Waste Directive, and WEEE Directive;
- promotion of economic instruments to discourage landfilling ;
- simplified and improved definitions and harmonised calculation methods for recycling rates throughout the EU;
- measures to promote reuse and stimulate industrial symbiosis;
- economic incentives for producers to put greener products on the market and support recovery and recycling schemes (e.g. for packaging, batteries, electric and electronic equipment, vehicles).

22 European Commission (2015) *Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste*

23 Date, W. (2017) 'MEPs back 70% recycling target', *Lets Recycle*

The development of these proposals has inevitably been a process of compromise between the 28 European Member States, and there are some areas which have given UK Ministers cause for concern. Rory Stewart MP, then Parliamentary Under-Secretary of State at Defra, stated in 2015 that the UK's main issues were with the proposed targets, and that the UK would like to see "the evidence base, particularly the cost-benefit analysis that's been done and why the Commission really believes these targets are sensible and achievable."[24] This line was continued by Thérèse Coffey MP, the Minister currently responsible for waste, who warned that the 65% recycling target proposed by the European Commission is "too high to be achievable".[25] The UK has argued in favour of an agreement which lightens the load on businesses, streamlines reporting obligations, and has voluntary rather than legally binding targets.

The UK's concerns about the Circular Economy package appear to be well-founded. Chapter 3 of this report provides a detailed critique of the proposals, identifying some significant shortcomings.

Impact of Brexit

The policies and targets defined in the Waste Framework Directive and other existing European waste Directives represent legal commitments which have already been transposed into UK law. Whether these targets will remain in the wake of Britain's decision to leave the European Union is an open question. The Prime Minister announced on October 3rd 2016 that most pieces of EU legislation would be established in UK law under a "Great Repeal Bill" and only then would be repealed or altered on a case by case basis. This suggests that existing waste targets and other aspects of EU waste legislation will remain in force in the short term, but could subsequently be altered.[26]

It is also unclear to what extent the EU Circular Economy Package will impact on the UK following Brexit. The timetable for reaching agreement on the Circular Economy package is somewhat uncertain. When it was originally presented to the European Parliament and European Council, in late 2015 it was thought that it would take up to 3 years to reach agreement at EU level, and only then would the Directive be transposed into UK law.[27] The UK Government has indicated that it intends to leave the EU by March 2019, at which point it is possible that the Circular Economy package could have been agreed at EU level, but not transposed into UK law – leaving some uncertainty as to its status under the Great Repeal Bill. Defra officials recently indicated that they intend to continue working with the EU on the Circular Economy proposals, although there still appears to be some uncertainty about whether they will be adopted by the UK.[28] It is unclear why the UK would want to continue to implement the Circular Economy package, given the shortcomings in policy design identified in Chapter 3.

There is also a question concerning the enforceability of EU waste policy, both in the period until the UK leaves the EU, and post-Brexit. Even prior to the Brexit vote, the European Commission had sought to pacify the UK's fears of further legally-binding targets, with Commissioner Karmenu Vella observing that no Member State has yet faced an infringement case for failing to meet its waste targets.[29]

24 LetsRecycle (2016) 'EU and UK at odds over recycling targets'

25 Date, W. (2016) 'Coffey: EU recycling target 'too high', *Lets Recycle*

26 Sky News (2016) 'Theresa May lays out Brexit timetable for leaving the European Union'

27 House of Commons Library (2015) 'EU Circular Economy Package', *House of Commons Briefing Papers*

28 Date, Will (2017) 'Defra preparing for adoption of the EU Circular Economy package', *Lets Recycle*

29 LetsRecycle (2016) 'EU and UK at odds over recycling targets'

Devolved Administrations

Waste policy is a devolved matter within the UK, and as such there are some differences in waste policy and regulation between England, Wales, Scotland and Northern Ireland.

The **Scottish Government's** *Zero Waste Plan* includes a target for 70% of all waste to be recycled, reused, or composted by 2025 (regardless of source) with an interim target of 60% by 2020.[30] The term "Zero Waste" is loosely defined but refers to an aspirational end point where no waste is sent to disposal. Under the plan, it became mandatory for food businesses in Scotland to separate out food waste for collection by 2014 or 2016 (depending on the size of the business). Scotland already has a landfill ban on separately collected recyclable materials, and biodegradable municipal waste will also be banned from landfill by 2021. Scotland has developed a *Circular Economy Strategy*, supported by over £70 million of investment, including £30 million in European Structural Funding.[31] Furthermore, sixteen of the thirty-two local councils in Scotland signed up to a voluntary Charter for Household Recycling in Scotland, which among other things sought to establish a common collection regime for paper, card, glass and other recyclable materials – along with food – across the country.[32]

Wales began implementing an ambitious set of waste policies from 2010 onwards under the *Towards Zero Waste* strategy.[33] The overall goal is to achieve a "zero waste economy" by 2050. Wales has set the same target as Scotland – for 70% of waste from all sectors to be recycled, reused, or composted by 2025. In addition, there will be a cap on the proportion of commercial and industrial waste sent to landfill of 10% in 2019/20, reducing to 5% by 2024/25.

Northern Ireland has its own Waste Management Strategy, which was originally developed in 2000, and updated in 2006 and 2013. This proposes a target for 60% of Local Authority collected municipal waste to be recycled or reused by 2020. Northern Ireland has also developed a waste prevention programme – '*The Road to Zero Waste*' (which again is loosely defined).[34] The Programme includes a number of measures including a capital fund to assist councils in their efforts to increase recycling. Certain businesses producing food waste were obligated to present such waste for separate collection from April 2016. The Northern Ireland Department for the Environment has also consulted on proposals to promote high quality recycling of dry recyclables, with a vision to improve the quantity of recycling as well as the quality of outputs.[35]

30 Scottish Government (2011) *Scotland's Zero Waste Plan*

31 Scottish Government (2016) *Making Things Last – A Circular Economy Strategy for Scotland*

32 Scottish Government/Convention of Scottish Local Authorities (2015) *Charter for Household Recycling in Scotland*

33 Welsh Government (2016) *Towards Zero Waste: One Wales: One Planet*

34 Department of the Environment (Northern Ireland) (2014) *Environmental Policy Division: The Waste Prevention Programme for Northern Ireland – The Road to Zero Waste*

35 House of Commons Library (2016) 'Household recycling in the UK', *House of Commons Briefing Papers*

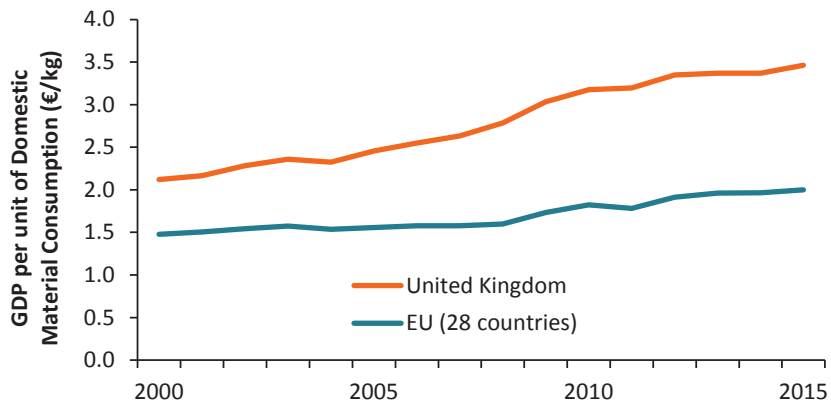
2
Current State of UK Waste Management

The policies outlined in the previous Chapter have had a transformational impact on the way that the UK uses resources and manages waste. This Chapter sets out the facts on the ground. The UK uses fewer resources and produces less waste than it did in 2000; there has been a significant increase in the proportion of waste which is recycled; and the overall environmental impacts of waste management have substantially declined.

Total Resource Use and Waste Arisings

In recent years, the UK has become far more efficient and productive in its use of resources. Total Domestic Material Consumption[36] has reduced by 20% since 2000 - from 740 million tonnes in 2000, to 590 million tonnes in 2013. The improvement in resource productivity is even greater when we consider the change in resource use per unit of GDP. In 2000, the UK generated €2.1 of GDP per kilogram of materials consumed, but by 2015 this had increased to €3.50/kg – an increase of 63%. In other words, the UK now produces 63% more economic output per kilogram of material input than it did 15 years ago (after adjusting for inflation). This "de-materialisation" of our economy is to an extent to be expected, given the structural shifts in the UK economy towards services and knowledge-intensive sectors, and the move towards digital products and services. However, it is notable that the UK is significantly more productive in its use of resources than the EU as a whole, generating 73% more economic output per unit of material than the European average (€3.50/kg compared to €2.00/kg).

Figure 2.1 GDP per unit of Domestic Material Consumption[37]

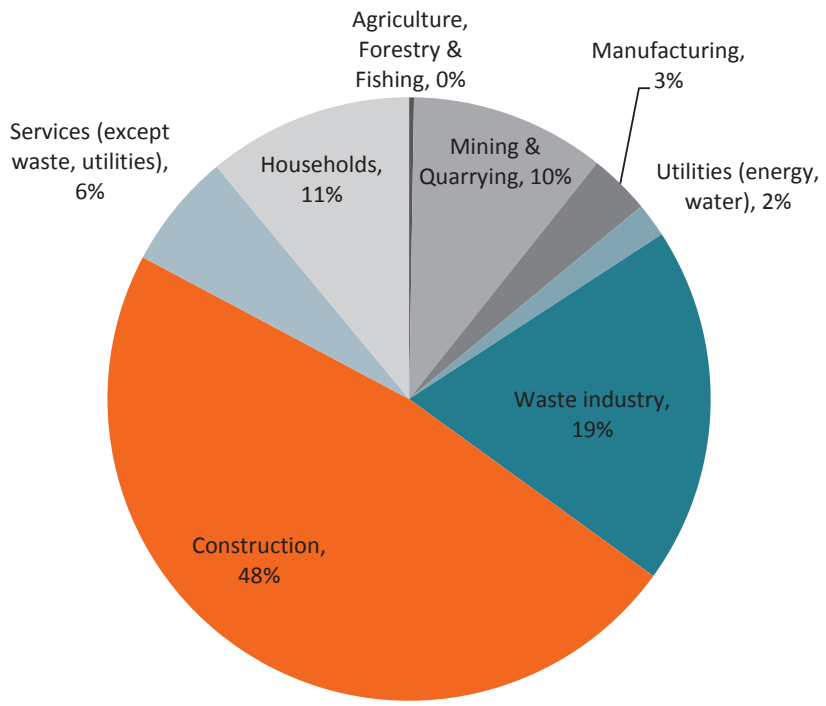


36 Domestic Material Consumption is a measure of the total weight of resources we consume, including resources extracted within the UK, plus imports of resources and goods, minus exports.

37 Eurostat (2017) *Resource Productivity Statistics*

Nonetheless, the UK remains a major waste producer, generating 203 million tonnes of primary waste in 2014, plus a further 50 million tonnes of secondary waste from the waste management industry itself.[38] Almost half of the total waste output comes from the construction industry (48%), with the waste industry accounting for a further 19%. Households and the Mining and Quarrying sector each produce a further 11% of total waste arisings. The remainder is made up by services (6%), manufacturing (3%) and utilities such as electricity, gas, water and sewage (2%).[39]

Figure 2.2: Waste Generated by Sector (2014)[40]



The total amount of waste generated in the UK has fallen significantly from around 300 million tonnes in 2004, to around 250 million tonnes in 2014 - a decrease of 16% (Figure 2.3). There was a sharp reduction in waste arisings over the period 2008-2010, likely due to the recession. Manufacturing waste has declined significantly from 35 million tonnes of waste in 2004 to 8 million tonnes in 2014 (76% reduction), whilst waste from the service sector declined from 39 million tonnes in 2004 to 16 million tonnes in 2014 (60% reduction). Total waste arisings have increased since 2010, mainly driven by an increase in construction waste, which increased from 100 million tonnes in 2010 to 120 million tonnes in 2014.[41]

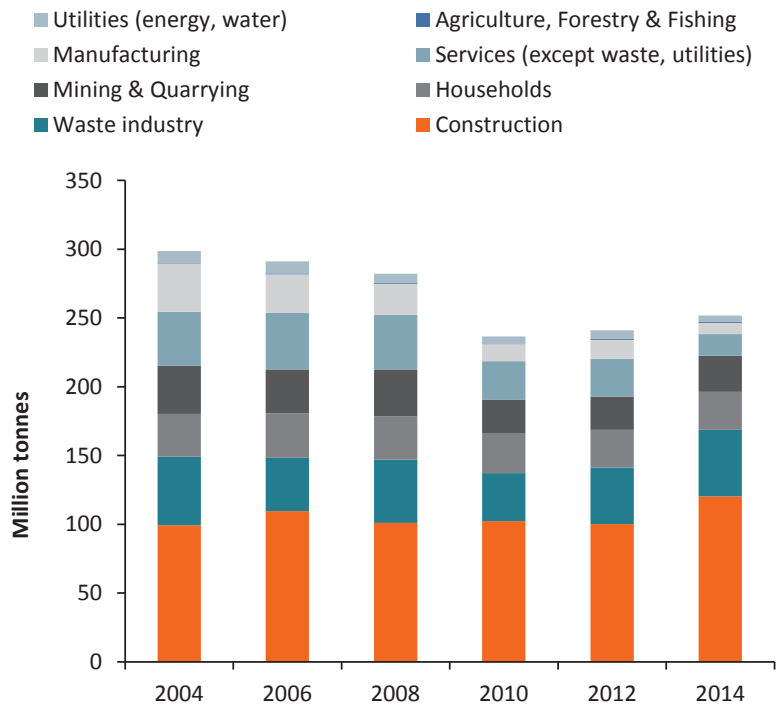
38 Defra (2016) *UK Statistics on Waste*

39 European Commission (2016) *Generation of waste by waste category, hazardousness and NACE Rev.2 activity.* Eurostat

40 Defra (2016) *UK Statistics on Waste*

41 Ibid.

Figure 2.3: Total UK Waste Arisings by sector[42]



The data available on waste streams other than municipal waste is surprisingly limited. However, as mentioned above, the construction sector now accounts for nearly half of total UK waste. Despite this increase, the UK has managed to achieve a very high rate of recycling and recovery of construction waste (90% in 2014). This means that the UK is substantially ahead of the Waste Framework Directive target for 70% of construction and demolition waste to be recovered by 2020.[43]

Table 2.1: Treatment of Construction Waste in the UK and England[44]

	UK			England		
Year	Waste Arisings (Million tonnes)	Recovery (Million tonnes)	Recovery Rate (%)	Waste Arisings (Million tonnes)	Recovery (Million tonnes)	Recovery Rate (%)
2010	49.5	43.4	87.6%	43.9	39.7	90.5%
2011	50.0	43.8	87.6%	44.1	39.9	90.6%
2012	51.2	43.8	88.6%	45.3	41.3	91.1%
2013	51.9	45.3	89.8%	46.3	42.1	91.1%
2014	55.0	49.4	89.9%	49.1	44.9	91.4%

42 Defra (2016) *UK Statistics on Waste*

43 Ibid.

44 Ibid.

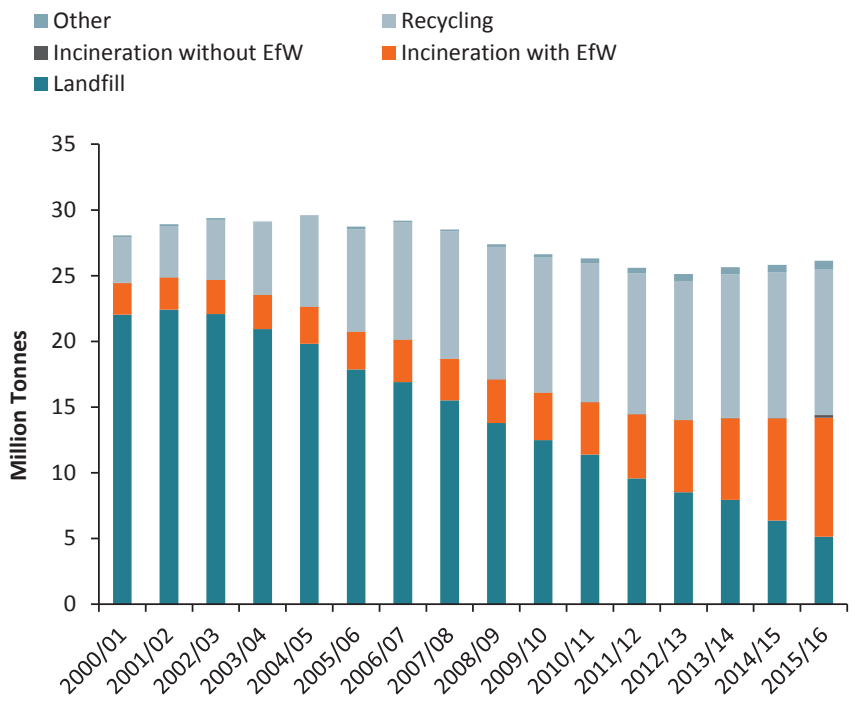
Municipal Waste

Because so many of the reporting requirements under the EU Waste Framework Directive concern municipal and household waste, data is most easily available for these categories of waste. In absolute terms UK households generate around 27 million tonnes of waste per annum, of which 22 million tonnes is produced in England, 2.3 million tonnes in Scotland, 1.2 million tonnes in Wales, and 0.8 million tonnes in Northern Ireland.[45]

In terms of municipal waste (which includes household waste plus some business waste collected by Local Authorities) waste arisings totalled 26 million tonnes in England in 2014-15. This represents a slight long-term reduction compared to the 28 million tonnes of municipal waste in 2000-01. Whilst only a small reduction in absolute terms, the growth in household numbers in intervening years means that the amount of municipal waste has reduced significantly from 1,150 kg per household in 2000, to 960 kg per household in 2015 (a reduction of 16%).

The way in which this waste is treated has changed substantially. In 2000/01 nearly 80% of municipal waste went to landfill, 12% went to recycling and 9% to energy from waste. By 2014/15 less than 20% of municipal waste went to landfill, the recycling rate had increased to over 40%, and more than 30% of waste was sent to energy from waste facilities.

Figure 2.4: Municipal Waste in England[46]

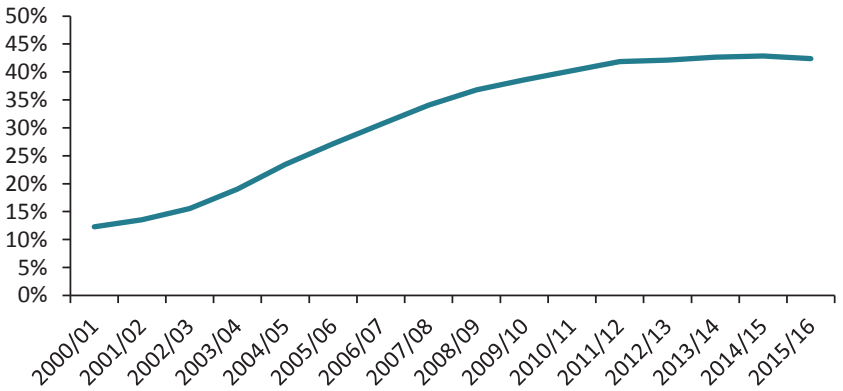


45 Ibid.

46 Defra (2016) *ENV18 - Local authority collected waste: annual results tables*

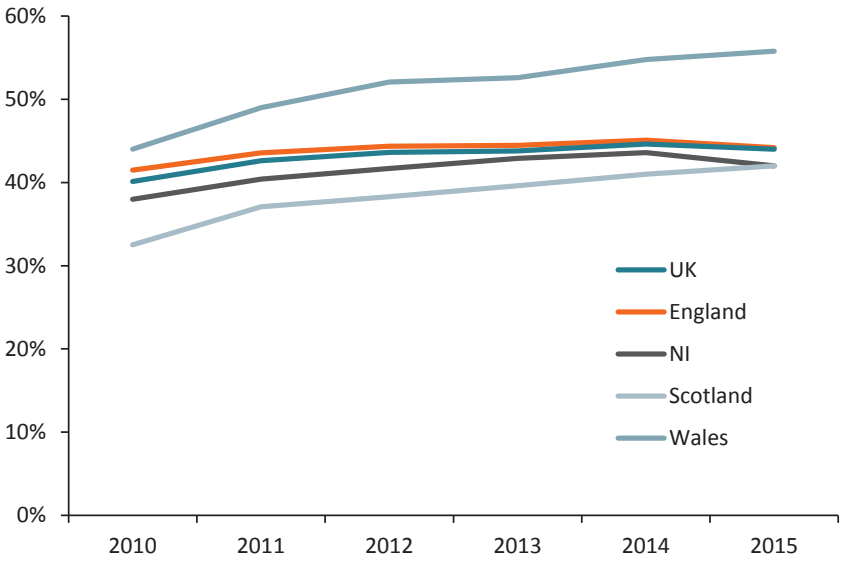
Whilst the headline recycling rate has increased significantly since 2000, it is clear that this trend has stalled in recent years (Figure 2.5). The recycling rate has barely increased since 2011, and actually fell for the first time in 2015/16 (from 42.9% in 2014/15 to 42.4% in 2015/16). Defra blamed the phenomenon upon a cold summer, resulting in less composting.[47] As a result, it is unclear whether this is the start of a trend or just a one-off, but certainly supports the conclusion that recycling and waste progress is stalling. We discuss the economics of recycling in more detail in Chapter 3.

Figure 2.5: Municipal Recycling Rate in England[48]



Household waste recycling rates are similar across England, Scotland and Northern Ireland, but considerably higher in Wales, which achieved a municipal waste recycling rate of 56% in 2015 (although as discussed further in Chapter 3, there are differences in reporting methodology between England and the Devolved Administrations).[49]

Figure 2.6: Household Recycling Rates in the UK[50]



47 Goulding, T. (2016) 'England recycling rate 'in reverse' data shows', *Lets Recycle*

48 Defra (2016) *ENV18 - Local authority collected waste: annual results tables*

49 Defra (2016) *UK Statistics on Waste;* Defra (2015) *ENV18 – Local authority collected waste: annual results tables*

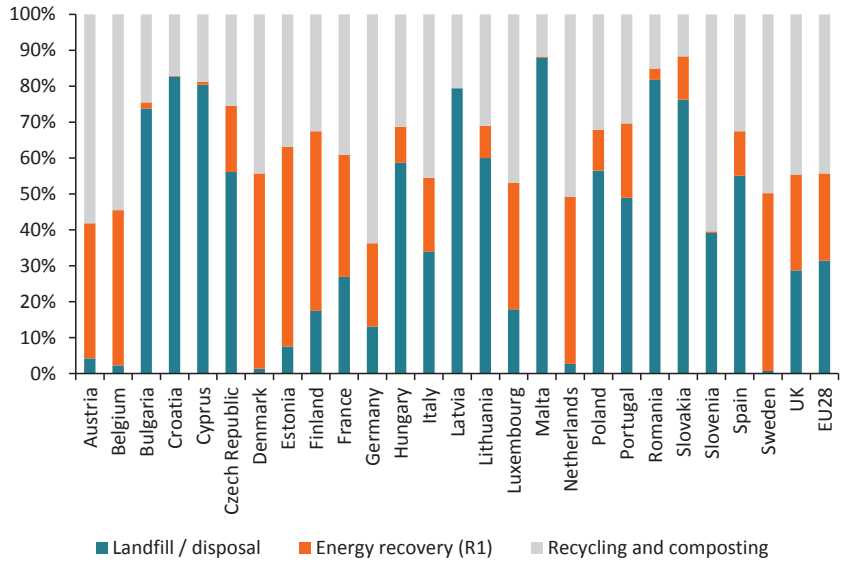
50 Defra (2016) *UK Statistics on Waste.* Note that this dataset differs slightly to that in Figure 2.5 which used a legacy methodology. It has been calculated in accordance with the Waste Framework Directive, and includes household collections, bulky waste, and waste from civil amenity sites.

Comparison with Europe

EU countries vary significantly in terms of the amount of waste they generate and their approach to waste management. At one extreme, almost all municipal waste in Sweden, Denmark and the Netherlands is either recycled, composted or sent to energy recovery, with almost nothing going to landfill. At the other extreme, Croatia, Cyprus and Malta send around 80% of their waste to landfill. The UK figures, of 44% composting/recycling, 27% energy recovery and 28% landfill, are actually very close to the EU average (43%, 24% and 31% respectively).

This is also the case in terms of the amount of municipal waste generated. UK citizens produce 482 tonnes of waste per capita per year - only slightly higher than the EU28 average of 474 tonnes. The European average masks a significant range, from 758 tonnes of waste per capita in Denmark, to only 272 tonnes per capita in Poland (albeit that some of this variation is likely due to differences in the definitions of waste streams, as discussed in Chapter 3).

Figure 2.7: Municipal Waste by Treatment Route[51]



Waste and Local Authority Budgets

Waste management represents a significant cost to Local Authorities, totalling £3.5 billion across all Local Authorities in England in 2016-17.[52] Expenditure on waste services has been stable at around this level since 2010, but at the same time, overall Local Authority budgets have shrunk from £104 billion in 2010/11 to £94 billion in 2016/17.[53] This means that waste management has increased as a proportion of Local Authority spending from 3.3% in 2010/11 to 3.7% today.

Whilst waste remains a relatively small component of Local Authority budgets, the fact that spending in this area is static represents a significant issue, since it means that savings will have to be made in other council budgets – such as social care, street management, parks and libraries. It is difficult to see how Local Authorities could bear any further costs associated with waste management at the current time, and conversely will be seeking to make savings in this area where possible.

51 European Commission (2017) *Municipal waste by waste operations*

52 Figure does not include budget for street cleansing, but does include waste collection, disposal, recycling costs, trade waste and waste minimisation budgets.

53 DCLG (2016) *Local authority revenue expenditure and financing*

Trading of Waste and Scrap Materials

Waste and scrap materials are traded on the global market just like raw materials and goods. The UK is a net exporter of scrap materials to the rest of the world, having exported 21 million tonnes of scrap materials worth around £3.9 billion in 2016. This compares to imports of 6.3 million tonnes worth £0.9 billion, resulting in net exports of 14.8 million tonnes worth £3.1 billion. Imports and exports of scrap materials have grown enormously in recent years (see Figures 2.8 and 2.9). Net exports increased by more than 400% on a weight basis, and more than 600% on a value basis since 2000.[54]

The most important materials in terms of exports are metals (65% of total value of exports), textiles (18%) and paper (11%), whilst the most important import commodity by far is waste wood and cork (89% of total value of imports). It is notable that the volume of exports (by weight) has continued to increase in recent years, whilst the *value* of exports has declined significantly since 2011. This is due to the fact that materials prices have declined substantially in recent years - a point we return to in Chapter 3.

Figure 2.8: UK Trade in Scrap Materials, by Value[55]

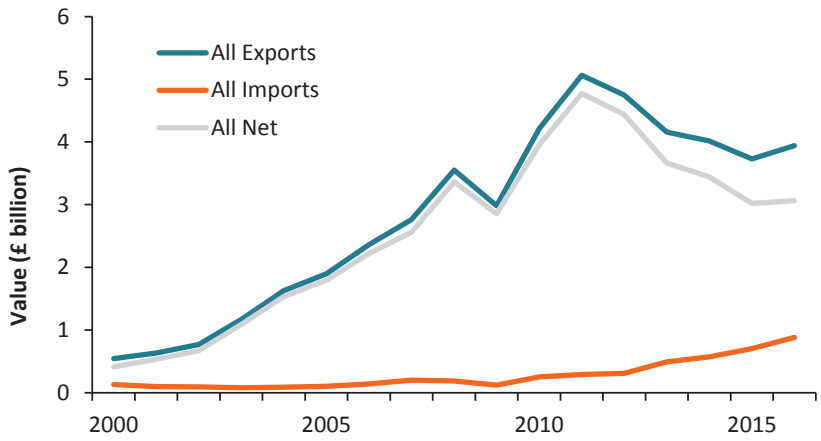
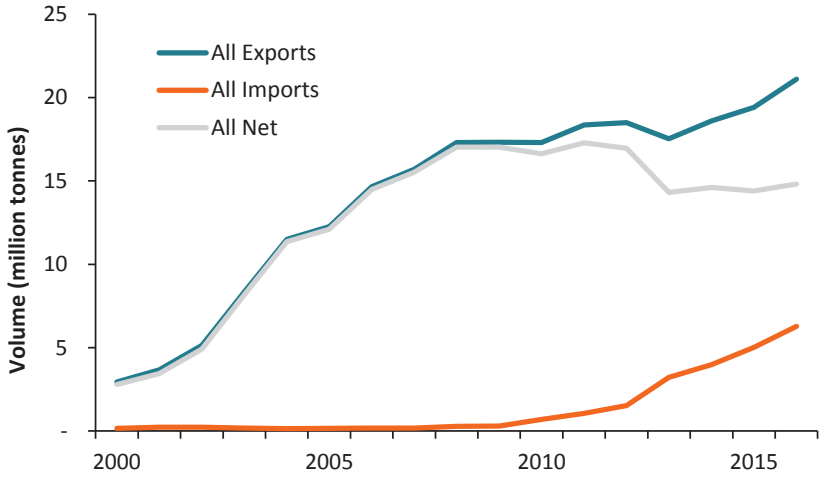


Figure 2.9: UK Trade in Scrap Materials, by Weight[56]



54 HMRC (2017) *Data Tables: UK Imports and Exports by Commodity Code.* UK Trade Info

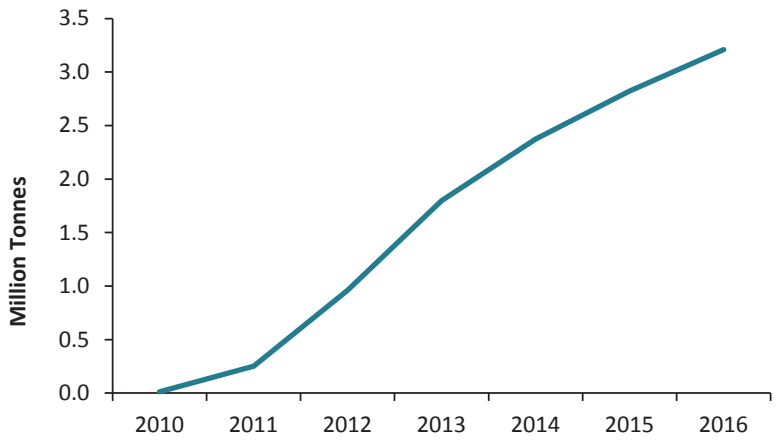
55 Ibid.

56 Ibid.

Refuse Derived Fuel (RDF)

The majority of waste exports are sent for recycling and reprocessing abroad, and represent a growing source of income for the UK. A second major category of waste export is that of 'Refuse Derived Fuel' (RDF)[57] which as described in Chapter 1 is manufactured from residual waste and exported to other countries for energy recovery. Exports of RDF have grown substantially in recent years, from close to zero in 2010, to 3.2 million tonnes in 2016.[58]

Figure 2.10: Trend in UK Exports of Refuse Derived Fuel[59]



Unlike other exports, where the UK obtains revenues for what it is exporting, exports of RDF represent an additional cost to the UK. The current "gate fee" charged for RDF exports is £87 per tonne. This is slightly lower than cost of landfilling waste in the UK (£103 per tonne) or sending waste to a UK-based energy from waste facility (£89 per tonne). In essence, the side-effect of the increasing Landfill Tax (Figure 1.2) is that more and more waste is being exported from the UK (in order to avoid the tax). **The export of refuse derived fuel will cost the UK around £280 million in 2016, and has cost the UK a total of more than £900 million since 2011. In other words, UK businesses and households are paying £280 million per year to export waste to other countries where they use it to generate heat and power.**

The main destinations for RDF exports from the UK are the Netherlands, Germany, and Sweden (Figure 2.11).[60] The Netherlands alone accounts for nearly half of the UK's total exports of RDF, and Germany and Sweden together account for another third.

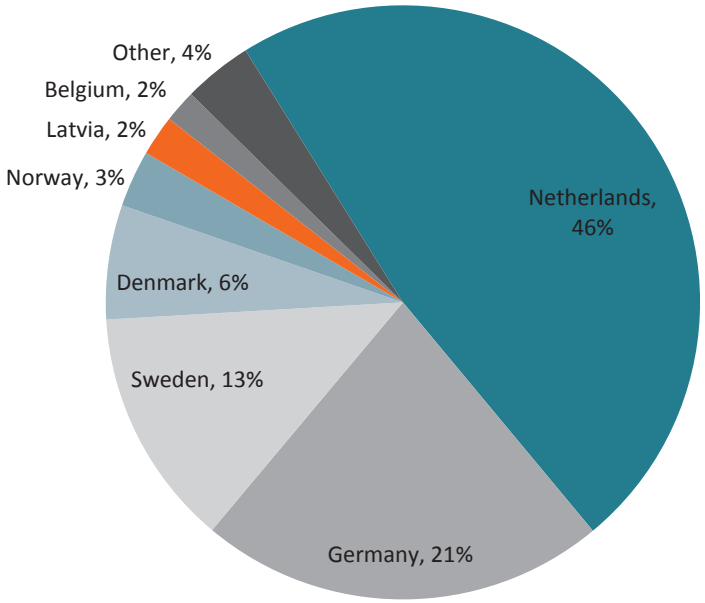
57 Figures also include Solid Recovered Fuels

58 Defra (2016) *International Waste Shipments Exported from England 2010-2016*

59 Ibid.

60 Defra (2016) *Digest of Waste and Resource Statistics: 2016 Edition (revised)*

Figure 2.11: Destination of UK Exports of Refuse Derived Fuel (Jan. 2016 – Oct. 2016)[61]



There is some uncertainty about the future trend in RDF exports. The recent fall in Sterling is likely to increase the cost of RDF exports, since continental facilities quote their gate fees in Euros.[62] For this reason, some commentators speculate that RDF exports could decrease in 2017.[63] In the medium term, a key question is the possible impact of tariffs (and potentially non-tariff barriers) on RDF exports once the UK has left the EU and potentially also the Single Market. It is notable that non-EU countries exporting waste to the EU are generally subject to WTO tariffs at 6.5% or higher. If UK exporters are subject to the same tariffs, then this would further increase the cost of RDF export as a waste treatment route.

Environmental Impact of Waste Management

The environmental impacts associated with waste management have significantly reduced in recent years, due to changes in the way we treat waste, combined with improvements in environmental practices in the sector.

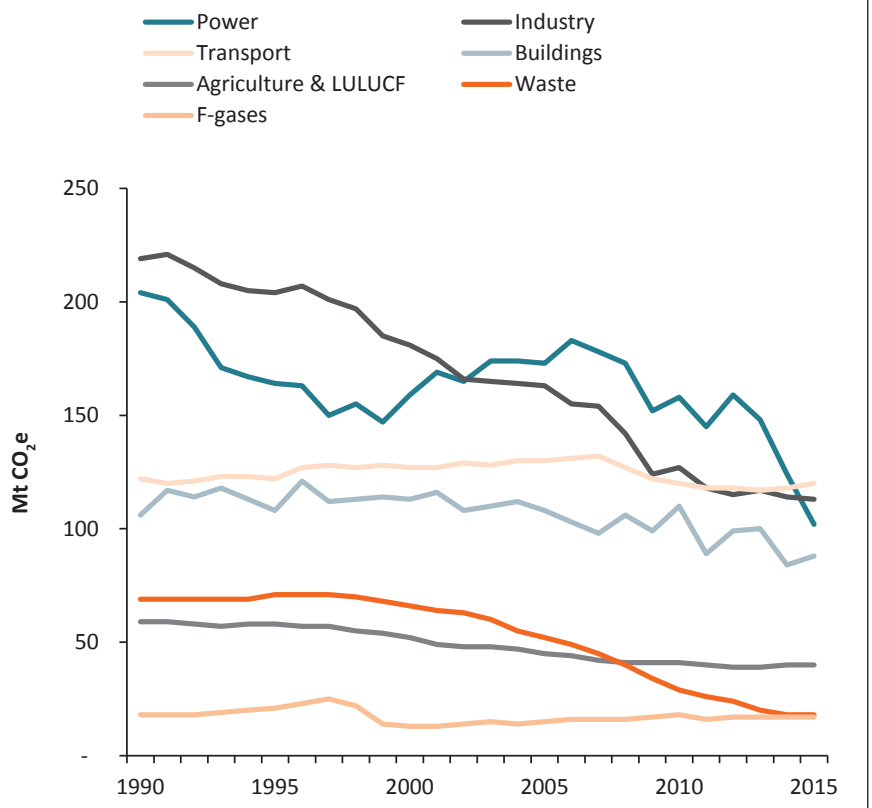
The greenhouse gas emissions associated with waste management in the UK have declined by 74% since 1990. Greenhouse gas emissions mainly arise from biodegradable waste ending up in landfill sites, where it breaks down producing methane, a potent greenhouse gas. The amount of biodegradable waste sent to landfill has reduced by 72% since 1990. In addition, the amount of landfill gas which is captured, rather than escaping into the atmosphere, has increased from close to zero in 1990 to two thirds of total methane emissions in 2014. Putting these factors together, the waste sector has delivered the fastest reduction in greenhouse gas emissions of any part of the UK economy – outpacing the power sector (50% reduction since 1990), buildings (17%) or transport (2%).

61 Defra (2016) *International Waste Shipments Exported from England 2010-2016*

62 LetsRecycle (2016) 'Gate fees and exchange rate 'putting pressure' on RDF exports', *Lets Recycle Website*

63 Eunomia (2016) *Residual Waste Infrastructure Review (11th Issue)*

Figure 2.12: UK Greenhouse Gas Emissions by Sector[64]



The emissions of other pollutants from waste management facilities have also fallen sharply – for example from energy from waste facilities such as incinerators. The direct emissions from energy from waste facilities are regulated under the European Industrial Emissions Directive and Waste Incineration Directive. These Directives set mandatory Emission Limit Values and monitoring requirements for a number of pollutants including particulate matter (or dust), sulphur dioxide, nitrogen oxides, hydrogen chloride, carbon monoxide, organic carbons, heavy metals, and dioxins.[65] Operators of energy from waste facilities must comply with these limits, through optimisation of the combustion process and the clean up of flue gases.

Whilst there may be concerns about emissions from energy from waste facilities, the reality is that they tend to operate well within the emissions limits that have been set, which in any case are the most stringent for any thermal processes regulated in the EU.[66] As part of this project, Policy Exchange compiled data from three different incinerators operated by two different companies.[67] This shows that all three facilities are operating well within emission limit values for all regulated pollutants. All three facilities emit less than 10% of the limit value for Total Organic Carbon, and less than 15% of the limit value for carbon monoxide.

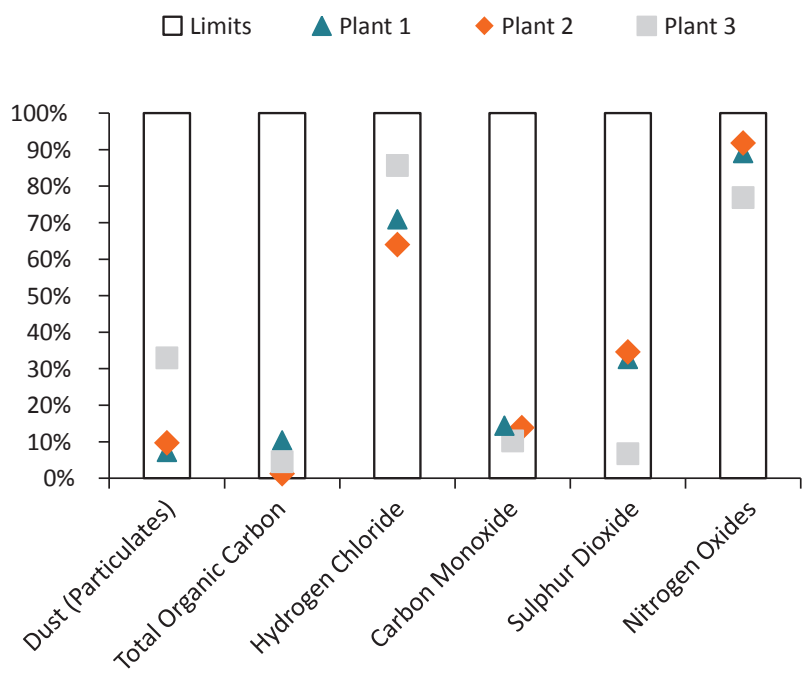
64 Committee on Climate Change (2016) *Meeting Carbon Budgets – 2016 Progress Report to Parliament*

65 Defra (2014) *Energy from Waste: A guide to the debate*

66 Defra (2013) *Advanced Thermal Treatment of Municipal Solid Waste*

67 Note: as some of this information is not in the public domain it is not possible to identify the specific companies or facilities.

Figure 2.13: Emissions from Energy from Waste Facilities



The total emissions from incineration are declining due to advances in technology and flue gas treatment, and in many cases now appear small in contrast to other sources of pollution. For example, concerns are often expressed about the emissions of dioxins and heavy metals from incinerators. However, the reality is that total dioxin emissions from UK incinerators have fallen by 99% since 1990, and now stand at 3 grams International Toxic Equivalent per year.[68] To put this in perspective, this is less than half of the total dioxin emissions from crematoriums across the UK (11 grams), and around 10% of the dioxin emissions from the open burning of waste (26 grams). Emissions of Arsenic, Cadmium, Lead, and Mercury (all Heavy Metals) from incinerators have fallen by more than 99% since 1990.[69]

On this basis, the Government's Waste Strategy for England (2007) concluded that there is "no credible evidence of adverse health outcomes for those living near incinerators."[70] More recently, Public Health England stated that "modern, well-managed incinerators make only a small contribution to local concentrations of air pollutants" and consequently the health impacts of incinerators are "likely to be very small and not detectable."[71]

68 Defra (2016) *National Atmospheric Emissions Inventory*

69 Ibid.

70 Defra (2007) *Waste Strategy for England 2007*

71 DEFRA (2014) *Energy from Waste: A guide to the debate*

3
Critique of the European Waste Policy Framework

The previous Chapter shows that the current set of European waste policies has had a transformational impact on waste management practices in the UK, and there are many positives that can be taken from this. However, it remains the case that the European waste policy framework is far from perfect. This Chapter provides a critique of European waste policies highlighting a number of significant shortcomings with the current approach, in particular:

- **Objectives are unclear:** The objectives of European waste policy have evolved over time and have now become very unclear. This is particularly true of the proposed Circular Economy package, which appears to be justified as an end in itself, rather than a means to achieving a particular set of economic, environmental or social outcomes. The notion of a 'circular economy' is open to interpretation – for example, it is unclear whether the EU is trying to make the economy more circular at Member State, European, or global level.
- **Targets prescribe the means not the ends:** The targets set under the Waste Framework Directive and Circular Economy package prescribe the *methods* of waste treatment, rather than environmental outcomes. There are a number of serious side-effects to the use of weight-based recycling targets, which may be leading to perverse outcomes.
- **Fails to reflect UK context:** Cost benefit analysis shows that the targets proposed by the European Commission under the Circular Economy package represent a poor choice from the UK's perspective. They would impose an additional cost on UK businesses of £1.9 billion (in the period 2015-35). The Commission's own analysis shows that it has failed to select the optimal set of policies either at EU or UK level.
- **Ignores the fundamentals:** European waste policies are focused on the achievement of ever higher levels of recycling, and fail to reflect the economic fundamentals. The economics of recycling have deteriorated in recent years due to the fall in commodity prices since the Great Recession. This has impacted on the value of secondary materials and the viability and profitability of recycling activity. It is difficult to see how the UK will achieve the even more ambitious recycling targets proposed by the EU without increasing the cost to businesses and households.
- **Poor data and definitions:** Waste policy suffers from some serious issues regarding definitions, measurement, and data quality. There is significant

divergence within the UK and between European countries on how waste flows are defined and measured. Official recycling figures are likely to overstate the actual amount of recycling taking place, since they mask the amount of contamination in the materials handled by recycling firms. The data on non-municipal waste streams is generally very poor.

Objectives are Unclear

Waste policy has long been a cornerstone of European environmental policy. In the 1970s and 1980s, a number of scandals concerning the handling of waste alerted policymakers to the potential impacts that poor waste management practices could have on the environment and on human health.[72] This led to the first Waste Framework Directive and Hazardous Waste Directive, both approved in 1975, and later to the Landfill Directive in 1999. These Directives were clearly focused on addressing environmental risks and issues of public nuisance.

However, over time it has become progressively less clear what European and UK waste policies are trying to achieve, or the overarching objective(s) being pursued. The Waste Framework Directive (2008) states that *"the first objective of any waste policy should be to minimise the negative effects of the generation and management of waste on human health and the environment"*, but it does little to identify specific negative effects or show how the policies underpinning the Directive will alleviate these effects. The Waste Management Plan for England (2011) sets out a high level ambition for a "zero waste economy" – a term which is ill-defined. The Circular Economy package is even less clear about its over-arching objective(s). It appears to be justified on the basis that it will have benefits, rather than on the basis that it represents the best set of policies to achieve a particular set of economic, social or environmental outcomes. Little has changed since 2009 when Policy Exchange commented that *"it is difficult to state succinctly what is the ultimate goal of government policy towards waste"*.[73]

Environmental policies vary considerably in terms of how they are framed, and there are examples of good and bad practice. In general, the more successful policies, such as the *Montreal Protocol on Substances that Deplete the Ozone Layer*, are clearly framed around a specific environmental issue and start with an appreciation of the science. The Montreal Protocol had a singular focus on tackling ozone depleting substances, on the basis that this would prevent adverse impacts on human health such as skin cancer and cataracts. The group which negotiated the Montreal Protocol included scientists, and this lent credibility to the process. The value of having such a clear mission is enormous.

In contrast to the Montreal Protocol, the EU Circular Economy package is at best indirectly linked to environmental outcomes, and the ultimate goal of the policy is very unclear. It is centred on the proposition that adopting a circular economy approach will lead to a number of benefits, which are identified as follows:

- Boost the EU's competitiveness by protecting businesses against scarcity of resources and volatile prices.
- Create new business opportunities and innovative, more efficient ways of producing and consuming.
- Create local jobs at all skills levels and opportunities for social integration and cohesion.

72 European Commission () *The Story Behind the Strategy: EU Waste Policy*

73 Coggins, C. et al (2009) *A Wasted Opportunity.* Policy Exchange

- Save energy and help avoid the irreversible damages caused by using up resources at a rate that exceeds the Earth's capacity to renew them in terms of climate and biodiversity, air, soil and water pollution.
- Enhance security of supply.

However, the *EU action plan for the Circular Economy* document says remarkably little about the environmental challenges it is supposed to address, the benefits that could be realised by the proposed policies, or whether these are the optimal set of policies to achieve a particular outcome (in fact as we show below, cost benefit analysis shows that the proposed policies are far from optimal – either for the EU or the UK). It also overlooks the fact that the environmental impacts associated with waste management have already reduced substantially, as discussed in Chapter 2.

The European Commission also fails to define some very basic principles about the approach it is advancing. For example, when it talks about creating a more circular economy – at what scale is this circularity supposed to take place? Is the plan to make the *European* economy more circular? Or to make the economy of each Member State more circular? Or is it a broader point about making the global economy more circular? What view does the EU take on the trading and export of materials for recycling and reuse elsewhere?

The Circular Economy package provides at best vague answers to these questions. It states that "the action plan focusses on action at EU level", but then goes on to say that "the circular economy will also need to develop globally". The European Commission's position on the trading of waste or export of Refuse Derived Fuels (for incineration in other countries) is unclear. Under the Waste Framework Directive, the Commission advocated the principles of self-sufficiency and proximity – and went on to suggest that Europe as a whole should be self-sufficient in infrastructure for recovery and disposal, but says rather less about self-sufficiency in recycling infrastructure. Whilst the UK Government also buys in to the 'proximity principle', it is also supportive of the trading of waste materials internationally, and has stated that "the global trade in waste for reuse, recycling and recovery generates significant benefits for global resource use, reducing carbon emissions globally."[74]

The Circular Economy package also contains some questionable objectives concerning job creation. An explicit objective of the Circular Economy package is to *"create local jobs at all skills levels and opportunities for social integration and cohesion"*. Whilst on face value this might seem like a laudable aim, it raises significant questions about whether it is appropriate to use waste policy as a tool for job creation (rather than fiscal or monetary policy) and about the wider impacts of this approach.

In many ways, such an approach is reminiscent of the industrial policies of the past. As discussed in a recent Policy Exchange Report, *The New Industrial Strategy*[75], there are many examples of governments protecting industries in order to create domestic jobs, under the guise of 'industrial policy.' However, such approaches often fail in the long term, as they undermine competitive pressures between firms, and international competitiveness. *The New Industrial Strategy* identifies that Britain's core economic challenge is that of low productivity, not a shortage of jobs. The UK has near full employment, but productivity has been largely stagnant over the last decade. Today the UK has around 77% of US productivity on a per hour

74 Defra (2011) *Government Review of Waste Policy in England 2011*

75 Dupont, J. and Howard, R. (2016) *The New Industrial Strategy.* Policy Exchange

basis, or 73% on a per person basis. Given the close link between productivity and incomes, the sluggish growth in productivity is one of the core reasons that real household incomes have stalled over the last decade. It is far from clear that the Circular Economy package will deliver the highly productive, highly paid jobs that the UK desires.

Moreover, it needs to be recognised that the creation of jobs, in the manner suggested in the Circular Economy package, is not without cost. The cost of these jobs will fall on other businesses and consumers, leading to a range of possible effects across the wider economy, such as:

- reducing the resources available to businesses to invest for long-term growth;
- reducing business competitiveness, placing UK businesses at a competitive disadvantage to foreign competitors subject to lower policy costs; and
- reducing the disposable income of consumers, reducing their expenditure on other goods and services.

In summary, the Circular Economy is based on a particularly vague set of objectives, some of which are questionable as policy objectives, and most of which are only loosely tied to specific economic, environmental or social outcomes. It is as if the creation of a more circular economy has become an end in itself, rather than a means to an end: *"the transition to a more circular economy… is an essential contribution to the EU's efforts to develop a sustainable, low carbon, resource efficient and competitive economy"*.[76] The Circular Economy Action Plan reads as a mission without a purpose.

The risk of this approach is that if the objectives are unclear, then it is almost impossible to arrive at an optimal set of policy solutions, and the risk of inefficiency or unintended outcomes is high. As commented in our previous report, *A Wasted Opportunity*, "a confused strategy with contradictory targets and goals is a major block to getting the most out of the waste stream."[77]

Targets Prescribe the Means not the Ends

Beyond the high level narrative, both the Waste Framework Directive and the Circular Economy package propose a set of targets for recycling and reuse, as described in Chapter 1.

The fundamental problem with these targets is that they prescribe the *methods* of treatment, rather than any particular set of economic, environmental or social *outcomes*. The Waste Framework Directive and Circular Economy package contain little justification for why this particular set of targets will achieve the best outcome (or indeed how 'best' should even be assessed). The Circular Economy Action Plan states that the targets "should lead Member States gradually to converge on best-practice levels" of recycling and reuse – but fails to justify why achieving these "best practice levels" will be beneficial. Overall, little has changed since in 2009 Policy Exchange commented that "waste policy as a whole has tended to focus far too much on means and too little on ends."[78]

Related to this, there are a number of issues with the way that targets under the Waste Framework Directive and Circular Economy Package are structured:

76 European Commission (2015) *Closing the loop - An EU action plan for the Circular Economy*

77 Coggins, C. et al (2009) A Wasted Opportunity. Policy Exchange

78 Ibid.

- **Weight-based targets:** The first issue is the fact that targets are measured in terms of the *weight* of materials recycled. The risk with this approach is that it encourages the collection and recycling of heavier materials, irrespective of whether this is the most environmentally beneficial course of action. For example, this has encouraged an increase in the collection of bulky garden waste, some of which would have previously been composted in household compost bins. The flipside of this is that there is little incentive to collect waste streams which are environmentally damaging but relatively light. Materials vary significantly in their environmental impacts (per tonne of waste) and this simply is not reflected in a system based on weight-based targets.
- **Quantity not Quality:** A related issue is that the weight-based targets encourage a focus on quantity, not quality. A risk of this approach is that it encourages more waste to enter the recycling stream, even if it is contaminated or of poor quality (a point we return to later in this Chapter). This can create additional costs for waste re-processors, and undermine the value of recyclates.
- **Relative not Absolute:** The targets are based on the *proportion* of waste arisings rather than the *absolute* quantity of materials consumed or the amount of waste arising. Setting the targets based on the proportion of total waste arisings overlooks how a country performs in terms of overall resource use and waste generation. As it happens, the UK is relatively frugal in terms of the amount of resources we use – consuming 9.2 tonnes of materials per capita per year, compared to 13.3 tonnes per capita across the EU as a whole (and more than 20 tonnes per capita in countries such as Finland, Estonia, Ireland, Romania, Sweden, Denmark, and Austria). The structure of European waste targets, focused on the *proportion* of waste which is recycled or reused, fails to recognise that the UK is far more productive in the use of resources in the first place.
- **Conflict with the Waste Hierarchy:** setting targets based on the proportion of waste recycled or re-used may also be somewhat in conflict with the overall "waste hierarchy" described in Chapter 1, which prioritises waste prevention over reuse or recycling. Measures to prevent waste arising do nothing to contribute to the targets as currently framed, and may even work against them. For example, recent successes in reducing the weight of packaging (such as glass and plastic bottles) has been identified as one of the factors contributing to the stagnation in recycling rates in recent years. By reducing the weight of glass and plastic packaging, this has also reduced the amount (weight) of glass and plastic recycled, undermining the achievement of the recycling target. In of itself, the target for recycling and reuse does nothing to encourage waste prevention.
- **Targets specific waste streams:** the final issue is that European waste policies arbitrarily target particular sources of waste. The Waste Framework Directive and proposed Circular Economy package focus primarily on municipal and construction waste, but say rather less about other waste streams such as industrial and commercial waste (despite the fact that they may be similar in composition to municipal waste). This means that opportunities to improve waste management may be overlooked in other sectors – due to a lack of policy focus. This is not helped by the fact that data quality on commercial and industrial and other waste streams is generally poor.

Fails to Reflect the UK Context

Another key question is whether the specific proposals advanced under the EU Circular Economy package have been designed with the UK in mind.

In the latest iteration of the EU Circular Economy package, seven different sets of policy proposals and targets were considered for inclusion, and a final preferred option was then selected. The European Commission published an Impact Assessment showing the costs and benefits of each of these seven proposals (see Table 3.1), broken down into the direct cost/benefit (e.g. the additional costs of implementation set against the revenues from sales of materials) and the indirect cost/benefit (e.g. externalities such as the reduction in greenhouse gas emissions or local pollution).

Table 3.1: Summary of Policy Proposals Considered under the Circular Economy Package[79]

Option	Recycling/ reuse target for municipal waste, 2030	Recycling/ reuse target for packaging waste, 2030	Landfill reduction target for municipal waste	Time derogations for compliance
3.8a	65%	75%		No
3.8b	70%	80%		No
3.8c (preferred option)	65%	75%	10%	No
3.9a	65%	75%		Yes
3.9b	70%	80%		Yes
3.9c	65%	75%	10% by 2030	Yes
3.9d	70%	80%	5% by 2030	Yes

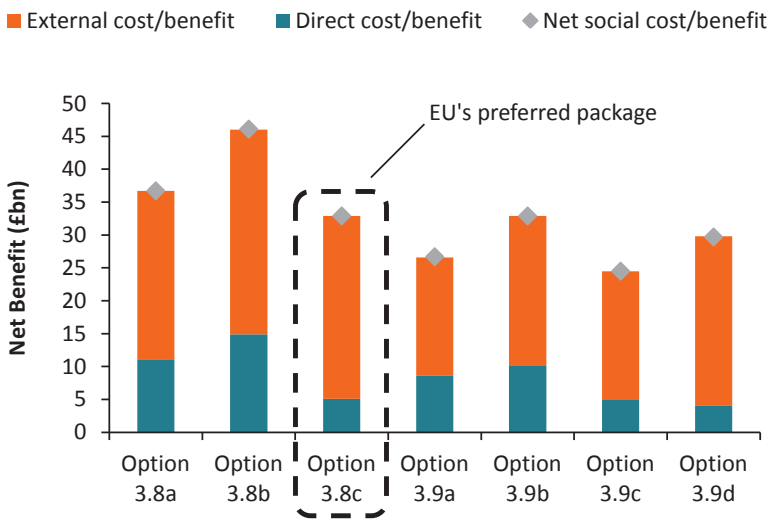
This shows that across the EU as a whole, all seven policy packages come out very positively, delivering an overall social benefit of £25-46 billion between 2015 and 2035.[80] The EC's preferred policy package (Option 3.8c) delivers a net social benefit of £33 billion, comprising a direct benefit to business of £5 billion, and external benefits valued at £28 billion.

However, the analysis shows that alternative policy proposals defined in Option 3b would achieve a far greater social benefit (£46.1 billion). **The European Commission appears to have picked a sub-optimal set of targets under the Circular Economy package, ignoring its own analysis showing that alternative proposals would deliver a greater benefit overall.** The main difference between the preferred Option (3.8c) and other options is that it includes a limit on landfilling. This is one of a number of examples of where the European Commission has tried to limit landfilling despite the marginal environmental benefits and significant economic costs of doing so.

79 European Commission (2015) 'Commission Staff Working Document: Additional analysis to complement the impact assessment at SWD (2014) 208 supporting the review of EU waste management targets', *European Commission Document Archive*

80 This value represents the Net Present Value of costs / benefits over the period 2015 to 2035.

Figure 3.1: Cost-Benefit Analysis of Options for the Circular Economy Package (EU results)

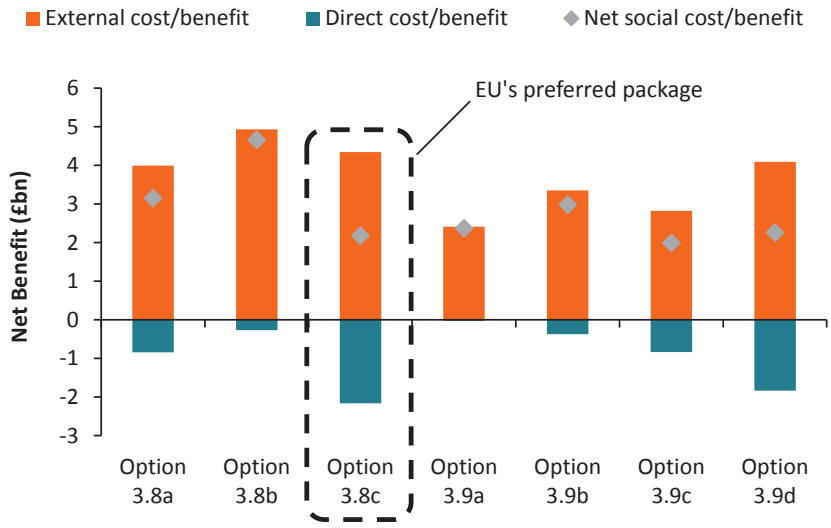


The same analysis presents a very different picture in terms of the costs and benefits of these proposals to the UK. As with the EU results, the analysis shows that the overall social cost/benefit of the proposals is strongly positive. However, the analysis also shows that, unlike the EU as a whole, **the Circular Economy proposals would impose a net direct cost to business of as much as £2 billion.**[81] The direct cost of implementing the Circular Economy proposals in the UK would be greater than any savings to business. It is unclear whether these additional costs would be borne by waste management firms or Local Authorities, but ultimately they are likely to fall on end consumers.

Another striking feature of this analysis is that the EC's preferred option (Option 3.8c) would impose the highest cost of any option considered, and deliver the lowest net social benefit to the UK. By contrast, Option 3.8b has a much lower direct cost and far higher net social benefit. The explanation for this is unclear. However, it is notable that the two options with the highest direct cost (Options 3.8c and Option 3.9d) are those which include a mandatory landfill reduction target.

81 This value represents the Net Present Value of costs / benefits over the period 2015 to 2035.

Figure 3.2: Cost-Benefit Analysis of Options for the Circular Economy Package (UK results)



In summary, the European Commission's own modelling suggests that it has made a poor choice in selecting targets under the Circular Economy package – both at EU and UK level. The specific policy proposals selected would impose an additional cost of £2 billion on UK businesses, for no additional environmental benefit. This reinforces the need for the UK Government to develop its own set of waste policies which better suit the UK context.

Overlooks the Fundamentals

Another weakness of the Circular Economy package is that it overlooks the fundamental economic context – specifically the fact that the economics of recycling has substantially worsened in recent years. As noted above, the Circular Economy package has been predicated on the basis that resources are scarce, resource prices are volatile, and therefore we must find ways to create a more "circular" economy. Some commentators have gone further, justifying the move to a circular economy on the basis that resource prices are increasing ever upwards, and resources may one day "run out".

The EC's 2014 communication on circular economy suggested that "the boom in commodities prices in the 2000s contributed to putting the circular economy higher on the agenda".[82] Similar statements were made in evidence given to an enquiry into the circular economy by the Environment Audit Committee in 2014.[83] The Ellen MacArthur Foundation, one of the key proponents of circular economy thinking, stated that "the century of commodity price declines enjoyed between 1900 and 2000 were effectively erased in the first decade of this millennium. There are few signs that this trend will be reversed". In the same enquiry, Green Alliance predicted a "great resource price shock" due to the combination of rising demand and constrained supply. These concerns echo previous Neo-Malthusian concerns about resource scarcity, for example the "Limits to Growth" predictions made by the Club of Rome in 1972, and the "peak oil" debate which has been going on since as far back as 1919.

82 European Parliament (2014) *Turning waste into a resource: Moving towards a 'circular economy'*

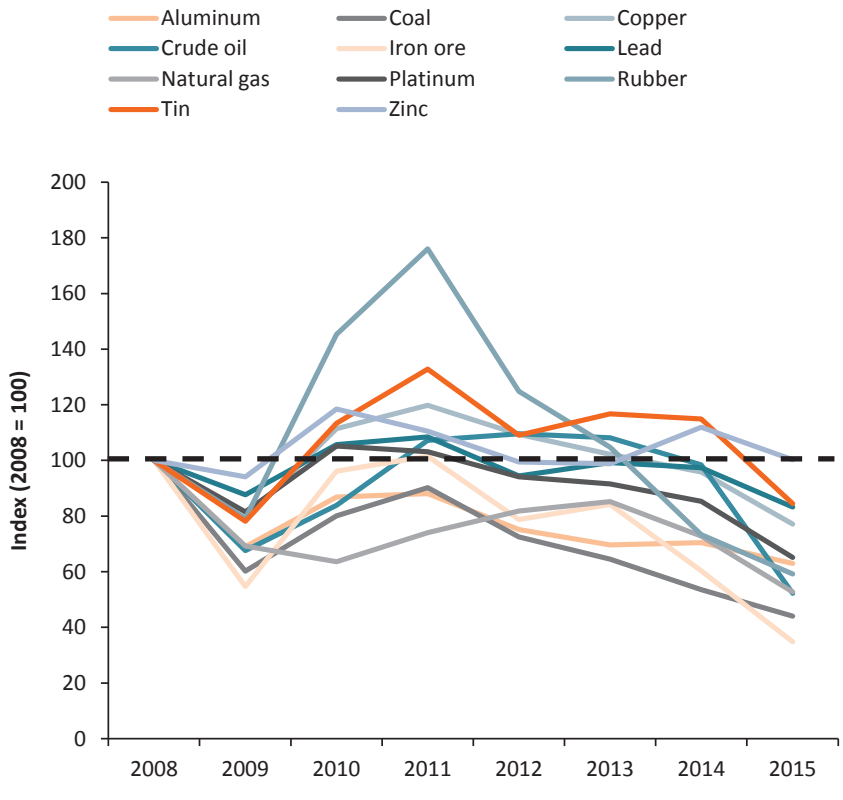
83 House of Commons Environmental Audit Committee (2014) *Growing a circular economy: Ending the throwaway society.* House of Commons

The (uncomfortable) reality is that this rhetoric is at best only partially true. Whilst it is true that global demand for resources continues to rise, the supply of resources is not static and has also expanded to meet demand. The Ellen MacArthur Foundation itself recognises that "mankind has shown incredible persistence and ingenuity in finding access to new sources."[84]

Long term trends in commodity prices provide a highly nuanced picture about developments in the supply and demand for raw materials. A study by Jacks (2013)[85] suggests that the long term trend in commodity prices can be broken down into a series of long-run trends, medium-run cycles, and short-run boom/bust episodes. The study suggests that real commodity prices have generally been on the increase since 1900, although it makes a distinction between "commodities to be grown", which have seen a long term decline in prices, and non-renewable "commodities in the ground" which have seen increases in real prices.

However, since the Great Recession from 2008, and particularly since 2011, there has been a marked decline in the price of a range of commodities (Figure 3.3). Since 2008, the price of iron ore has declined by nearly 70% in real terms; the energy commodities such as coal, oil and gas have fallen by 50%; and aluminium, platinum and rubber have all declined by more than 40%.

Figure 3.3: Index of Real Commodity Prices (2008=100)[86]



The decline of commodity prices has a significant bearing on the economics of waste management activities, in particular the economics of recycling. As Ian Wakelin, CEO of Biffa, stated to the *Financial Times*, "recycling is a commodities

84 Ibid.

85 Jacks, D.S. (2013) 'From Boom to Bust: A Typology of Real Commodity Prices in the Long Run', *NBER Working Paper*

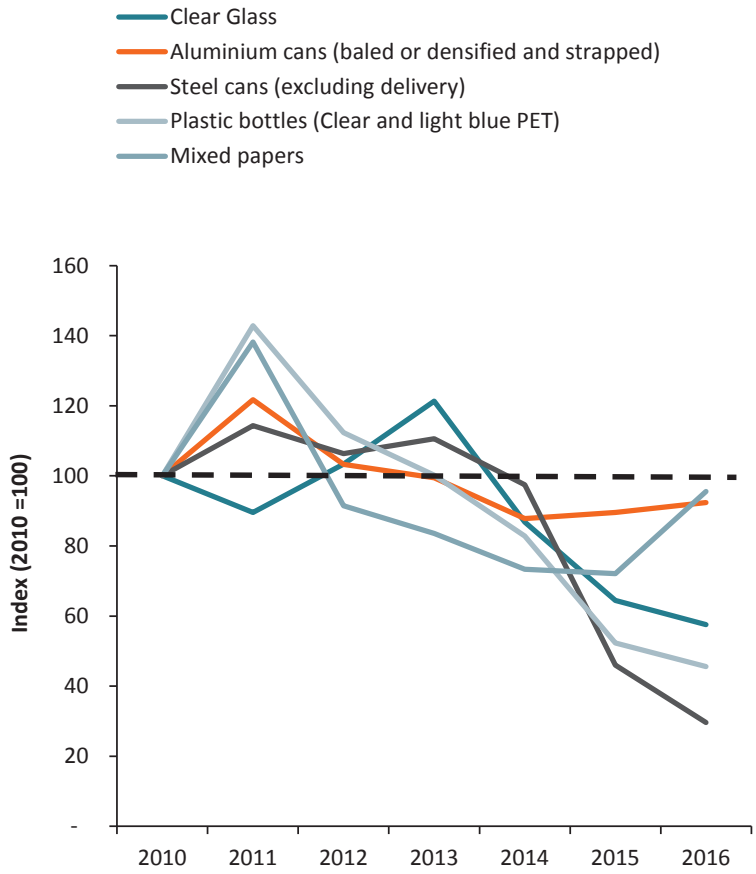
86 World Bank (2017) *World DataBank: Global Economic Monitor (GEM) Commodities*

business".[87] In many cases, recycling firms produce secondary materials which are direct substitutes for virgin raw materials, and therefore the price of these commodities has a significant bearing on the overall economics and returns.[88]

Compounding the fall in commodity prices is the fact that domestic demand for raw materials is also falling. As noted above, total Domestic Material Consumption in the UK has reduced by some 20% since 2000 (see Figure 2.1), and exports of secondary materials are increasing over time (see Figure 2.10).

The combination of these factors has resulted in a reduction in the value of secondary materials from UK-based re-processors (Figure 3.4). The prices of glass, steel and aluminium cans, plastic bottles, and mixed paper have all fallen since 2010. At the extreme, the prices of steel cans has fallen from £146 per tonne in 2011, to £33 per tonne in 2016 (a fall of 74%).

Figure 3.4: Indexed Price of Secondary Recycled Materials (2010=100)[89]



This has made it uneconomic to recycle certain materials, as the cost of collection, separation and reprocessing now outweighs the likely revenues. For example, the cost of recycling PTT plastic packaging (such as plastic pots, tubs and food containers/trays) is considerably higher than the revenues available when selling this secondary material in the market. Market analysts do not expect a significant recovery in the price of secondary materials.[90]

87 Plimmer, G. (2016) 'Recycling industry feels strain of falling prices', *Financial Times*

88 Candau, M. (2015) 'Recycling industry under pressure from falling raw material prices', *Euractiv*

89 Lets Recycle (2017) *Recyclate Price Data*

90 PWC (2016) *Restructuring Trends: Waste not want not: the changing face of the UK waste sector*

The commodity price movements described above present a very real risk to the profitability and viability of waste management firms. When commodity prices were high a few years ago, recycling companies would routinely pay local authorities to take mixed recyclates. But with the drop in the value of secondary materials, recycling companies have had to increase the 'gate fees' they charge when taking the same waste. The average gate fee charged by recycling facilities increased sharply from £6 per tonne in 2014/15 to £25 per tonne in 2015/16.[91] These values represent the average of all live contracts, including long-term fixed price contracts. It is therefore more informative to look at the gate fees charged under new contracting arrangements. For contracts signed in 2015, the average gate fee was £34 per tonne, compared to £5 per tonne for contracts signed in 2014.[92]

Waste management companies cannot always increase prices in this way, since waste services are often agreed on the basis of long-term fixed-price waste service agreements, whereby the waste management company is left managing commodity price risk. Waste management companies can sometimes reduce this risk exposure through a risk-sharing agreement, but this is not always possible if counterparts are unwilling to take on this risk. The Chief Executive of Biffa, a waste management company, recently commented that "every time a contract comes up we have to try to raise the price and negotiate a risk share."[93]

The failure to adequately manage commodity price risk has led to some notable company failures within the recycling sector, for example:

- **Closed Loop Recycling** used to operate a specialist facility for milk-bottle recycling in Dagenham, which produced over 80% of the recycled plastic used in milk bottles in the UK. The decline in the oil price has undermined the economics of recycling plastic bottles. Chris Dow, ex CEO of Closed Loop Recycling warned that 2015 would be the "most challenging year in history of the UK plastic recycling industry" because virgin polymer prices were undercutting those of recycled plastics.[94] The company reported a loss of £3.6 million in 2013, and was subsequently sold to Dubai-based Euro Capital.[95] However, the company was still losing around £300,000 per month, and went into administration in May 2016, resulting in the potential loss of 92 members of staff.[96] The assets of the company were acquired by Veolia in July 2016, which was expecting to run the plant at only a third of its 35,000 tonne-per-year output capacity.[97]
- **Kier Group,** the FTSE 250 construction and environmental services company, decided to leave the waste industry after warning in July 2016 that it would take a £33 million loss on its recycling business in the 2016 financial year. The company has commented that its recycling division "continues to be affected by the low oil price and, consequently, the price of recyclates."[98]
- **ECO Plastics** operated a 150,000 tonne-per-year facility in Lancashire, capable of processing 35% of the total plastic bottles collected in the UK each year. The company reported a loss of nearly £5 million in 2014, as a result of "reduced demand for recycled plastics and falling prices".[99] The company was forced to seek a buyer after the decline in material prices and was bought by the investment firm Aurelius in December 2014.[100]
- **Greencycle** was a provider of source-separated household waste collection services for councils in Durham and Congleton, with a processing facility at

91 Wrap (2016) *Gate Fees Report 2016*

92 Ibid.

93 Plimmer, G. (2016) 'Recycling industry feels strain of falling prices', *Financial Times*

94 Grant Thornton (2016) *An ever changing landscape: Waste and resource management review*

95 Lets Recycle (2015) *'Buyer moves in for Closed Loop Recycling'*

96 CIWM (2015) *'Staff Laid Off as Closed Loop Recycling Set to Cease Production'*

97 Lets Recycle (2016) *'Veolia to revive Closed Loop bottle recycling plant'*

98 Plimmer, G. (2016) 'Recycling industry feels strain of falling prices', *Financial Times*

99 Grant Thornton (2016) *An ever changing landscape: Waste and resource management review*

100 Holder, M. (2014) 'ECO Plastics acquired by investor Aurelius', *Lets Recycle Website*

Enfield.[101] The drop in commodity prices and declining demand from China for reclaimed cardboard contributed to the business becoming unviable. The *Daily Mail* reported that the group needed £85 per tonne of waste paper to turn a profit, but it was only receiving £55.[102] It entered administration in March 2009.

- **Ideal Waste Paper** was a waste paper and recycling business, operating a 100,000 tonne-per-year Materials Recovery Facility, handling waste from both Kent and the City of London. The forty year old family business had grown into a multi-million-pound business, but entered liquidation in December 2014.
- **Solena Fuels** - a partnership between British Airways and American bioenergy company Solena Group - established Europe's first "sustainable jet fuel plant." This project was announced in early 2010, and was due to open in 2017 at a former oil-refinery in Essex.[103] The plan was for BA to provide construction capital, in exchange for 16 million gallons of jet fuel per year for eleven years, at market competitive prices. This would have been 2% of its entire fuel consumption, and equivalent to all fuel used at London City airport. The fuel was to be derived from municipal waste from the London area. However, the project was mothballed at the end of 2015, with British Airways citing the reduction in crude oil prices, investor uncertainty and a lack of policy engagement.[104]

In summary, the economics of recycling have deteriorated in recent years as a result of falling commodity prices. To an extent this may explain the plateauing of recycling rates since 2011 (see Figure 2.6). The implication of this is that forcing Member States to achieve higher levels of recycling, as proposed in the Circular Economy package, is likely to be costly. Indeed, the cost-benefit analysis above shows that there would be an additional cost of up to £2 billion to the UK to achieve the targets under the Circular Economy package. This perhaps explains why Thérèse Coffey MP, the Minister currently responsible for waste policy, has warned that the 65% recycling target proposed by the EU is "too high to be achievable."[105]

Poor Data and Definitions

Another issue with the current approach is that there are significant weaknesses in the way that waste is defined and measured, leading to limitations and inaccuracies in the data collected.

Across the EU, there are some substantial differences in the definition and measurement of waste flows. For example, France tends to treat outputs from a Mechanical Biological Treatment process as compost, even though this approach is prohibited in most other European states.[106] Waste exports and backfilling are considered as recycling in some countries and not others.[107] Germany reports a 0% landfill rate, despite the fact that significant amounts of incinerator residues are landfilled (since it deems that these are already counted as 'energy recovery'). In effect the 0% landfill figure for Germany means that no waste is landfilled without some form of pre-treatment. Some Member States define municipal waste as Local Authority collected household waste, whereas others include a much greater proportion of commercial waste.

As well as the inconsistency at EU Member State level, there are also differences in the way that waste streams are defined and measured in different parts of the UK.

101 Lets Recycle (2009) *'Recycling firm Greencycle enters administration'*

102 Sims, P. (2009) 'Council left to deal with loads of rubbish after recycling company goes bust', *The Daily Mail*

103 Solena Fuels (2014) 'Solena Fuels: Sustainable Jet & Diesel Fuel from Waste', *Alternative Fuels & Propulsion Systems Conference*

104 Nelsen, A. (2016) 'BA blames UK government for scrapping of £340m green fuels project', *The Guardian*

105 Date, W. (2016) 'Coffey: EU recycling target 'too high'', *LetsRecycle website*

106 Environment Agency (2009) *The use and application to land of MBT compost-like output – review of current European practice in relation to environmental protection*

107 Zero Waste Europe (2014) *'And the best waste performing country in Europe is...Estonia!'*

For example, most Local Authorities in England use a standardised Defra format for waste data, which includes regular household collection and civic amenity sites, but excludes street sweeping, healthcare waste and other items. However, due to budgetary constraints, some Local Authorities still use systems that pre-date the latest guidelines, and do not cohere to them. This means that centralised figures involve some degree of estimation.[108] The municipal recycling figures for Wales include rubble, incinerator residues, material from beach cleansing, and plasterboard, which goes some way to explaining why Wales has a higher reported recycling rate (see Figure 2.6).[109] Meanwhile, Scotland's recycling statistics appear very rigorous, as since 2014 they have excluded some forms of composted waste which do not meet necessary quality standards.[110]

Many of these problems relate back to loose wording within the Waste Framework Directive on how to define waste. The European Commission attempted to improve the methodologies for reporting waste data in Commission Decision 2011/753/EU. However, this still allowed for four different methods for calculating the proportion of waste reused or recycled for the purpose of targets, which Member States could choose from.[111] Similar to much of European waste policy, there have been a series of substantial compromises to pacify individual Member States, the result of which has been to preserve extremely flexible and somewhat ambiguous definitions. In practice, the looseness of the language, and the number of different methodologies permitted has allowed Member States to work-around targets and ultimately to undermine them. It also means that comparative analysis of waste practices across Member States is extremely difficult.

The proposed Circular Economy Package includes various commitments to tackle these issues. Indeed, one of the first things that the European Parliament called for as part of the Circular Economy package was simply "clear and unambiguous definitions".[112] However, tellingly, the desire to move to less 'ambiguous' methods of data collection has resulted in resistance from some Member States about the adoption of further targets. For example, the German negotiating team reportedly argued against the setting of new targets until changes had been made to definitions and calculation methods.[113] Zero Waste Europe notes the irony of this position, stating that the fact that "Europe's top recycler [is] calling against a target they have already reached raises questions about the validity of their own statistics." It is reported that other countries such as Cyprus, Latvia, Lithuania, Bulgaria, Finland, Greece and Italy are all supportive of Germany's position that definitions should be improved before any new targets are set.

Beyond the differences in definitions, some of the data reported is seriously misleading. For example, Defra reports a headline municipal recycling rate of 42.4% for England in 2015/16. This represents the total quantity of materials arriving at recycling sites across the country (known as Materials Recovery Facilities or MRFs) as a proportion of total municipal waste arisings. However, not all of the material that arrives at these sites is eventually recycled. Households will often put the wrong sorts of materials in their recycling bins, due to confusion about what can be recycled (a point we return to in Chapter 4). Industry data shows that 12.9% of the material arriving at MRF sites is either 'non target materials' or 'non recyclable materials' – meaning that only 87.1% of the material that arrives at recycling sites is actually recyclable by the operator.[115] Recyclers strip out these 'non target' materials, which often then end up in the residual waste stream

108 House of Commons Library (2016) 'Household recycling in the UK', *Commons Briefing Paper*

109 Statistics for Wales (2016) *'Local authority municipal waste management report for Wales', 2015-16'*

110 SEPA (2016) *'Household waste – Summary data 2015'*
Natural Scotland & SEPA (2011) 'Use of Data to Support the Zero Waste Plan – Local Authority Recycling targets, Landfill Diversion and the Landfill Allowance Scheme', *Waste Data Flow*

111 European Commission (2011) 'Commission Decision 2011/753/EU', *Official Journal of the European Union*

112 European Commission (2015) 'Commission Staff Working Document: Additional analysis to complement the impact assessment at SWD (2014) 208 supporting the review of EU waste management targets', *European Commission Document Archive*

113 Perchard, E. (2016) 'Germany could call for removal of EU recycling targets', *Resource*

114 Crisp, J. (2016) 'Germany wants to scrap EU recycling targets', *EurActiv*

115 WRAP Materials Facility Reporting Portal (Q3 2016)

(destined for energy recovery or landfill). The remaining materials are sorted into different types (paper and card, plastics, glass, etc) and are then baled up to ship to re-processors. However, there may still be a degree of contamination in this material, which will be removed out later in the recycling process. Industry reports suggest that the level of contamination at the point that recycling streams leave a MRF facility is between 2.6% and 9.5%, depending on the material type.

On the flipside, the data almost certainly under-estimates the amount of reuse taking place (despite the fact that European targets relate to recycling and reuse). As discussed in Chapter 4, many Local Authorities do not collect statistics on reuse, even when they fund reuse activity within their area. Data on 'reuse' taking place through third party routes – such as charity shops, Ebay, and other marketplaces for second hand goods – is simply not integrated into waste statistics at all.

On face value, improving waste statistics and the definitions of waste may not seem particularly important. However, the failure to properly define and measure waste flows seriously undermines the ability of policymakers to develop sensible and well-targeted policies – *"you can't manage what you don't measure"*. It also undermines public confidence in the whole exercise of recycling and managing waste. Research by Viridor shows that 73% of people would like more transparency on what happens to their waste, and that 70% of people would be encouraged to increase their recycling levels if they knew more about what happened to their waste when it is recycled.[116]

116 Viridor (2016) *UK Recycling Index 2016*

4

Developing a new Waste and Resource Policy Framework for the UK

The previous Chapter highlighted some significant issues with the current European approach to waste policy. The objectives are unclear, the targets are badly designed, and the approach is undermined by poor data and loose definitions. Moreover, our analysis shows that the Circular Economy package fails to reflect the economics of recycling, and the cost to UK businesses and households of targeting ever higher rates of recycling.

So, what then, are the alternatives? Following Brexit, could the UK define a better approach to waste policy?

This Chapter argues that following Brexit, the UK Government should not simply accept the Circular Economy package, with all its shortcomings, but instead should define its own approach to waste and resource policy. This needs to be reframed around a much clearer set of objectives, with targets defined in terms of outcomes rather than methods of waste treatment, and policies designed to meet the over-arching objectives in the most cost-effective manner.

Setting the Right Objectives

As with any strategy, the first step should be to define a clear mission, together with a coherent set of objectives and targets. It is only then that the UK can devise an effective set of policies.

Ultimately, what the UK is trying to achieve is a pattern of resource use and waste management which is more sustainable – economically, environmentally and socially. In a previous report, Policy Exchange proposed that waste policy should be redefined around the 'triple bottom line', or the three pillars of sustainability: namely economic, environmental, and social factors. Developing this idea further, the Government could use these three pillars to set a number of headline objectives and targets for waste policy, as follows:

Economic

The first headline objective should be to maximise the resource productivity of the UK economy. This is about minimising the quantity of resources we consume in the first place (resulting in cost savings) and extracting the maximum value from waste through reuse, recycling, and recovery.

The overall resource productivity of the UK economy has increased substantially in recent years. As shown in Figure 2.1, the UK produces 63% more GDP per unit of material input than it did in 2000. However, the fact that the UK still generates around 250 million tonnes of waste per year (see Figure 2.3) is a visible sign that there are still inefficiencies in the way we use resources, and that further improvements could still be made.

Improving resource productivity represents a significant economic opportunity for businesses. The Waste Prevention Programme for England notes that inefficiency in the use of resources "results in increased costs to businesses for the purchase of unnecessary materials, and in the costs of disposing of those materials."[117] Research by Accenture has shown that there is potential to unlock $4.5 trillion of global growth through improvements in resource productivity.[118] Similar analysis by Oakdene Hollins for Defra in 2011 suggested that UK firms could realise resource efficiency savings of £55 billion per year (equivalent to a 5% increase in gross profits) mainly through improvements in waste management practices.[119] The bulk of these potential savings relate to the construction sector and manufacturing (where an estimated 45% of costs relate to materials).

We suggest that the Government should reframe waste policy around "resource productivity", as opposed to the more nebulous language of the "circular economy". Government policy towards waste and resource should be about helping businesses to identify and deliver genuine cost savings through improvements in the way that resources are used and wastes are managed. A key indicator to track progress on resource productivity is the material consumption per unit of GDP (see Figure 2.1), which can be tracked at aggregate level for the UK economy, and also for individual sectors.

Improving resource productivity is consistent with the thinking behind the Government's emerging Industrial Strategy. The Government's recently published green paper, *Building our Industrial Strategy*[120], highlights the opportunity to increase the productivity of UK firms by "reducing their raw material demand and waste" and promoting "well functioning markets for secondary materials and new disruptive business models that challenge inefficient practice." This report sets out some initial ideas of how to turn this high level thinking into practice.

Environment

Another headline objective should be to minimise the environmental damage associated with waste and resource use. Rather than the European Commission's approach of setting targets for the *quantity* of material recycled or reused, the Government should focus on the environmental outcomes of resource use and waste, and seek to minimise these impacts.

Waste management activities give rise to a number of environmental impacts – such as greenhouse gas emissions, air pollution, water pollution, noise, and land use change. However, as noted in the Waste Management Plan for England, "in many cases carbon acts as a good proxy for the overall environmental impacts of waste."[121] **On this basis, we propose that the UK's new waste and resources strategy should include a headline target to reduce the associated greenhouse gas emissions.**[122]

This approach already has some precedent within the UK. For example, a Defra-led review of waste policy in 2011 supported the use of a carbon metric by Local Authorities. The idea was that this would be reported alongside weight-based

117 Defra (2013) *Waste Prevention Programme for England: Call for evidence*

118 Lacy, P. and Rutqvist (2015) *Waste to Wealth: the Circular Economy Advantage*

119 Oakdene Hollins (2011) *Further Benefits of Business Resource Efficiency.* Defra

120 HM Government (2017) *Building our Industrial Strategy: Green Paper*

121 Defra (2011) *Waste Management Plan for England*

122 It will also be important to still consider other environmental impacts, such as air pollution, to avoid perverse effects arising from this approach.

recycling targets. The idea is yet to be rolled out nationally, but has been adopted within the Greater London area. The Mayor of London's Municipal Waste Strategy (2011) set a target to reduce the total greenhouse gas emissions associated with waste management activities. Local Authorities within the Greater London area are required to report annually on the total greenhouse gas emissions generated or saved through their waste management activities. The strategy comments that 'rather than focusing on particular waste management services or technologies, the Mayor will look at the outcomes of particular waste management methods, based on their lifecycle CO_2 emissions performance.'[123] Monitoring reports show that the net emissions from waste management activities have gone from +135,000 tonnes CO_2 in 2008/09, to -109,000 tonnes CO_2 in 2013/14 (i.e. from positive emissions to a net saving).[124] The Scottish Government also developed a carbon metric as part of its Zero Waste Plan.[125]

Adopting this approach nationally would be consistent with the Climate Change Act, Carbon Budgets and forthcoming Emissions Reduction Plan, as well as Defra's forthcoming 25 Year Plan for the Environment.

Social

The final pillar of the UK's approach towards waste and resources should be to ensure that policy is developed with consumers in mind, to minimise the burden on society. This way of thinking about environmental issues has been central to several previous Policy Exchange reports – for example our report *The Customer is Always Right*[126] stressed the need for Government to minimise the impact of energy policy costs on UK households. Government recognises energy affordability as an issue, indeed the Industrial Strategy emphasises the need to ensure the "shift to a low carbon economy is done in a way that minimises the cost to UK businesses, taxpayers and consumers".[127] The same thinking can be applied to policy concerning waste and resources.

One headline metric to consider is the total cost of waste management activities. As described in Chapter 2, the total cost of Local Authority waste management activities is currently around £3.5 billion per year, or around £130 per household (it should be noted that this represents only a share of the total cost of waste management activities, since household waste is only 11% of total waste arisings in the UK). As described in Chapter 2, Local Authorities are under significant pressure to reduce spending, and councils will be looking to reduce the amount they spend on waste management in order to protect other core areas of expenditure.

As well as cost, the other important factor at play is the satisfaction of end users with the waste management service they receive. In general, the level of satisfaction with Local Authority waste services is high. Research by the Local Government Association shows that 79% of people are satisfied with the level of service they receive (higher than the level of satisfaction with council services overall at 68%).[128] However, there are certainly examples where well-intentioned waste policies have led to significant consumer dis-satisfaction. For example, some councils are now moving to monthly collections of residual waste, on the basis that people are recycling more. This has led to significant push-back by local residents in some cases, as well as unintended consequences such as fly-tipping and the burning of waste.[129] The approach to waste policy needs to be designed with end users in mind.

123 Mayor of London (2011) *London's Wasted Resource*

124 Eunomia (2015) *Greenhouse Gas Emissions Performance Standard for London's Local Authority Collected Waste – 2013/4 Update*

125 Scottish Government (2011) *Scotland's Zero Waste Plan*

126 Howard, R. (2015) *The Customer is Always Right.* Policy Exchange

127 HM Government (2017) *Building our Industrial Strategy*

128 LGA (2016) *Polling on resident satisfaction with councils*

129 Hull, L. (2017) 'What a stink! New once-a-MONTH bin collections force families to burn rubbish and dump waste in the street', *The Daily Mail*

Refresh the Waste Hierarchy

Once the high level objectives of waste policy have been set, the Government needs to reconsider the overall approach to waste policy as defined by the waste hierarchy (Figure 1.1). At high level, the waste hierarchy appears to rank waste treatment options in a sensible order. However, as pointed out in a previous Policy Exchange report, *A Wasted Opportunity*, the waste hierarchy does not show how much one is preferred to another: "Is energy recovery only marginally less attractive than recycling or is it only slightly better than landfill?"[130]

In the previous section we suggest that one of the principal objectives of waste policy should be to minimise the environmental impacts of waste management, using greenhouse gas emissions as an indicator. A further development of this idea would be to refresh the waste hierarchy based on the greenhouse gas emissions per tonne of waste. The following table, part of the evidence base for the carbon metric developed in Scotland, shows the emissions impact of a number of waste types and treatment routes.

Table 4.1: Emissions Impact of Segregated Waste ($kgCO_2e$ emitted per tonne of waste treated) [131]

Waste type	Waste Prevention	(Preparation for) reuse	Open Loop Recycling	Closed Loop Recycling	Energy Recovery (Combustion)	Energy Recovery (Anaerobic Digestion)	Composting	Landfill
Textiles	-22,310	-14,369		-850	600			300
Aluminium Cans and Foil	-9,844			-9,245	31			21
Steel Cans	-2,708			-1,702	31			21
Wood	-666	-599	-381	-523	-817		285	792
Average plastic rigid	-3,281			-2,148	1,057			34
Average plastic film	-2,591			-1,450	1,057			34
Board	-1,038		-240	-240	-529			580
Paper	-955		-157	-157	-529			580
Food and Drink Waste	-3,590				-89	-162	-39	450
Glass	-895		16	-366	26			26
Garden Waste					-63	-119	-42	213

The data suggests a number of striking conclusions:

- Prevention and Reuse are substantially better than all other waste treatment options in terms of the greenhouse gas emissions avoided. This should be the focus for policymakers.
- Recycling is always preferable to landfill, although there are some materials (e.g. paper) where energy recovery is preferable to recycling.
- Energy recovery may be better or worse than landfill, depending on the material in question. For example, the figures suggest that energy recovery is the preferred treatment solution for paper and board (ahead of recycling) but is the worst option in the case of plastics.
- For food and garden waste, anaerobic digestion is preferable to other recovery /disposal options.

130 Coggins, C. et al (2009) *A Wasted Opportunity.* Policy Exchange

131 Defra (2011) *The Economics of Waste and Waste Policy*

- The most significant emissions savings (per tonne) are associated with materials such as textiles, food waste, plastics, and metal.

Adopting a carbon metric would have a dramatic effect on the overall policy approach towards waste. Rather than struggling to meet somewhat arbitrary European targets for the quantity (weight) of specific waste streams which are reused or recycled, the UK would directly manage and reduce the environmental impacts arising from waste management activities. This would bring about a change of mind-set to focus policymakers on the most cost-effective ways of minimising environmental impacts – whether this involves preventing waste from arising in the first place, boosting recycling, or maximising landfill gas capture. The Mayor of London's Municipal Waste Strategy highlights that one of the benefits of this approach is that it allows flexibility, in that waste authorities "can look across the whole waste system to find opportunities achieving the greatest CO_2 savings, depending on their specific circumstances."

The current set of policies is far from delivering the most cost-effective improvements. For example, policies such as the Landfill Tax are effective at diverting waste away from landfill, but do little to promote waste prevention or reuse – despite the apparent environmental benefits of doing so. The remainder of this Chapter works through the levels of the hierarchy identifying how changes could be made to better align policy with the high level framework described above.

Reduce, Reuse

It is clear from the previous section that far more consideration needs to be given to waste prevention and reuse, given the significant environmental benefits than can be realised (see Table 4.1). Preventing waste from arising in the first place, or reusing goods and materials, is preferable to recycling or energy recovery, and as such should be at the forefront of the Government's approach to waste and resources. That said, it is clear that this is far from the case at present, with EU and UK policy focused far more on recycling and recovery than prevention or reuse. This is not helped by European targets, which as described in Chapter 3, focus principally on recycling. There are also barriers to reuse taking place, as explored further below.

An illustration of the required shift in emphasis can be seen if we examine Local Authority expenditure on waste services. Local Authorities in England spend a total of around £3.5 billion per year on waste-related activities - the bulk of which is focused at the bottom of the waste hierarchy The vast majority of Local Authority waste budgets is spent on waste disposal (£2.1 billion), waste collection (£0.8 billion), and recycling (£0.6 billion), with just £15 million spent on 'waste minimisation' (just 0.5% of their total waste budget).[132] Councils have actually cut back the amount they spend on waste minimisation since 2010 (from £22 million to £15 million) whilst increasing expenditure on waste disposal and recycling (Table 4.2).

132 DCLG (2016) *Local Authority Revenue Expenditure and Financing Data*

Table 4.2: Local Government Net Current Expenditure on Waste Management in England (£ million)[133]

	Total Local Government Expenditure	Of which: Environ-mental Services	Of which: Waste	Waste collection	Waste disposal	Recycling	Waste mini-misation
2010-11	105,567	5,510	3,376	1,014	1,834	508	22
2011-12	99,469	5,339	3,442	944	1,927	554	21
2012-13	94,733	5,259	3,434	871	1,992	584	18
2013-14	96,526	5,291	3,527	872	2,061	605	17
2014-15	93,534	5,139	3,465	852	2,026	604	19
2015-16	91,859	5,048	3,469	839	2,037	598	17
2016-17	90,923	5,028	3,485	835	2,061	569	15

Recommendations:

- **Government should shift the emphasis of waste policy towards waste prevention and reuse. This needs to happen at all levels including Central Government and Local Government.**

Reuse on Household Waste and Recycling sites (HWRCs)

There is a significant opportunity for household items to be reused – such as appliances, furniture, textiles, and luggage. Goods and materials are often thrown away even when they are in working condition or in a state where it is still viable for them to be repaired – and instead end up in landfill or incinerators.

WRAP previously estimated that of the million tonnes or so of bulky waste items taken to household waste and recycling centres (HWRCs) each year, around half of this could be reused.[134] Similarly, it is estimated that a quarter of electronic devices deposited by households at waste centres could be reused – and could be worth around £230 million per year in resale value.[135] A study by the Local Government Association found that there was the potential to divert 600,000 tonnes of waste from disposal to reuse, which could save councils £60 million in waste disposal costs, and amount to a resale value of £375 million per year.[136]

Whilst the reuse of these goods and materials represents a sizeable opportunity, it is currently being held back in part due to EU and UK regulations. Current regulations are such that anyone transporting, buying, selling or disposing of waste, must be appropriately licensed.[137] The EU definition of waste is anything which the holder "discards or intends or is required to discard."[138] The practical implication of this is that once a household brings materials to a Household Waste Recycling Site (or 'tip' or Civic Amenity site as they are often referred to) it is considered "waste" and can therefore only be handled by a licensed operator. If an individual goes to their local waste site and spots a usable item, even before it has entered the bin or a processing area, then it is technically *illegal* for them to take it away. Similarly, once materials have entered a particular waste bin, it is illegal for the waste operator to remove these items – even if it is clear that they could be reused. In other words, current UK and EU regulations are a major regulatory blocker, preventing perfectly usable goods and materials from being reused.

133 DCLG (2016) *Local Authority Revenue Expenditure and Financing Data*

134 WRAP (2012) *Composition of kerbside and HWRC bulky waste*

135 LGA (2014) *Routes to reuse: Maximising value from reused materials*

136 Ibid.

137 Environment Agency (2016) 'Register as a waste carrier, broker or dealer (England)', *Gov.uk*

138 European Commission (2008) 'Directive 2008/98/EC', *Official Journal of the European Union*

Despite these rules, there are some examples of reuse schemes at waste sites in the UK (see Box 1). These are generally delivered by partnerships between waste management companies, Local Authorities and third sector parties such as charities. It is often the case that the goods collected are distributed to local charities or social enterprises, resulting in wider social benefits. It appears that the Environment Agency and Local Authorities are turning a blind eye to the rules mentioned above, and allowing waste companies to engage in reuse schemes anyway.

However, the legal grey area has meant that there are relatively few examples of such reuse schemes, and provision for reuse remains patchy. In a survey of Local Authorities about the potential for reuse of household goods, 78% of respondents said that the provision for reuse in their area was either "poor" or left "room for improvement".[139]

Box 1: Examples of Reuse activities[140]

Hull Reuse Shop: FCC Environment invested £400,000 in a "reuse shop" in East Riding of Yorkshire in 2015, which takes bulky items (from furniture to power tools) from across the Hull area. FCC Environment opened a reuse facility in Suffolk in 2016 with the Benjamin Foundation, and have more reuse shops in Ipswich and Cannock in Staffordshire. At all sites, items are tested and inspected before being presented for resale, with the proceeds donated to good causes.

Newbury Community Resource Centre: This social enterprise provides low cost furniture and other goods to support low income and vulnerable households (particularly the elderly and those on benefits). The centre diverts approximately 650 tonnes of waste per year from disposal, and helps around 23,000 individuals and households. The scheme is delivered as part of a 25 year waste services contract for West Berkshire Council, although the scheme is largely self-financing and the council provided only limited initial funding. This project is part of the wider Furniture Reuse Network, a group of approved reuse centres in the UK which is rapidly expanding and offers training and best-practice information for its members.

A model of what could become common practice is that seen on the Isle of Man. All four of the island's Civic Amenity sites have a reuse area, where unwanted but still useable items can be placed. Examples listed include books, CDs, furniture and kitchenware. People are free to come and drop off or take whatever items they require, free of charge.[141] This approach would technically be illegal within the UK or EU, but as a Crown Protectorate the Isle of Man falls outside EU waste laws and regulations.

In order to unlock this opportunity, Government needs to remove the regulatory barriers currently inhibiting reuse from taking place on household waste sites. Beyond this, steps could be taken to encourage Local Authorities to build reuse into their waste service agreements, either on a voluntary or mandatory basis. Both the Local Government Association and WRAP already provide support to Local Authorities on how to include reuse within waste service agreements.[142] Defra should consider whether to make it mandatory for Local Authorities to establish reuse schemes in their area.

139 CIWM / Beasley Associates (2016) *Reuse in the UK and Ireland*

140 Furniture Reuse Network (2016) *Social Impacts 2015/16;* Dimech, T. (2015) 'FCC Invests £400,000 in Yorkshire Reuse Shop', *Resource;* FCC Education (2016) *Ipswich Reuse Centre Press Release;*

141 Government of the Isle of Man (2016) 'Recycling Locations', *Isle of Man Government Website*

142 WRAP (2008) *Sample Social Clauses to Encourage Community Benefits from Waste*

Recommendations:

- **Government should remove the barriers to the reuse of goods and materials at Household Waste Recycling Centres (HWRCs). Government should consider whether to make it mandatory for all household waste sites to collect items for reuse – either for resale or for distribution to local charities.**

As well as removing regulatory barriers, there is a need to promote reuse opportunities to households and businesses more proactively. A survey by Beasley Associates found that the majority of Local Authorities do not actively promote reuse opportunities to their residents.[143] A study by CIWM identified that this may be because Local Authorities do not have the time or resources to promote reuse, or because of a lack of reuse opportunities in the local area.[144] Research by YouGov and the British Heart Foundation found that the most commonly cited reasons for not recycling or reusing furniture and electrical items are that households did not realise they could; it was too much hassle; or there were no facilities for recycling or reuse nearby.[145]

Government could do more to address this information gap. For example, Zero Waste Scotland has established the 'Reuse Line' project to connect local residents with reuse organisations to facilitate the collection of items such as furniture and household goods. Research by Zero Waste Scotland established that only a small proportion of potentially reusable items were being diverted from landfill, and that this was in part was due to households not knowing how to go about passing on reusable items. The Reuse Line is a relatively small initiative (staffed by 2.5 full time employees) but has resulted in more than 3,000 household items being collected for reuse in 2015.[146] Although the project is still in its infancy, there appears to be value in improving the information concerning reuse, bringing together consumers and third-sector projects to make use of items which would otherwise be thrown away.

Related to this, Government also needs to improve the data and information concerning reuse. The formulation of policy to promote reuse is severely hampered by the absence of widely collected or reliable information. Gaining an idea of the amount of goods and materials being reused would allow a much sharper policy focus than is possible at present. According to a survey by the CIWM, 30% of Local Authorities are not measuring the level of reuse taking place in their area at all, even when they stated that they were actively involved in reuse activity.[147] This is despite the fact that most reuse shops keep a fairly accurate track of the value and weight of the different items they pass on. It should be possible for Local and Central Government to collate this data with relatively little effort.

Recommendations:

- **Local Authorities should do more to promote reuse opportunities within their areas. This would ultimately reduce the amount they spend on waste collection, recycling and disposal. Defra, WRAP and Local Authorities should also develop a standard reporting framework to measure the quantity of goods and materials reused.**

143 Beasley Associates (2016): referenced in CIWM / Beasley Associates (2016) *Reuse in the UK and Ireland*

144 CIWM / Beasley Associates (2016) *Reuse in the UK and Ireland*

145 YouGov (2010) YouGov / *British Heart Foundation Survey Results*

146 CIWM / Beasley Associates (2016) *Reuse in the UK and Ireland*

147 Ibid.

Improving Product Regulations to Prevent Waste

It is estimated that 80% of a product's lifetime environmental impact is locked-in at the design stage.[148] Improvements in design can boost resource productivity and reduce wastage – for example, by making products more durable, easier to repair, or easier to recycle. For this reason, it is vital that policy thinking concerning waste and resources considers product design in addition to 'end of pipe' solutions to deal with waste.

The key European policy concerning product design is the Eco-design Directive (2009/125/EC) which created a framework to set environmental performance standards for many different types of products.[149] To date these regulations have been primarily concerned with improving energy efficiency and reducing carbon emissions. They have been somewhat controversial in the UK, for example, there was a significant press backlash when it was suggested that the EU might bring in new rules banning the sale of powerful vacuum cleaners in 2014.[150] However, the fundamental thinking behind Eco-design standards is sound: in the absence of regulatory standards, manufacturers have little incentive to improve the environmental performance of their products.

In addition to improving energy efficiency, product standards could also be a vehicle to improve other aspects of design related to resource productivity – such as improving the durability, reparability, and recyclability of products. If products were designed to be more durable and easier to repair, then replacement cycles would be extended and the amount of waste would be reduced. Furthermore, if products were designed to make it easier to recycle them, then a much higher proportion of electrical waste could be diverted to recycling. Examples include being able to double the average life-span of white goods by easily replacing smaller components, or saving an upgrade on a smart-phone because the screen can be replaced more cheaply when it cracks.[151] This not only benefits the environment, but would also lead to consumer savings, reducing the total cost of owning and maintaining appliances.

The European Commission plans to revisit the Eco-design Directive as part of the Circular Economy Action Plan, and incorporate additional requirements related to durability, reparability, and recyclability. Following Brexit, the Government will need to consider the future of product standards in the UK. The Prime Minister has proposed a model of Brexit whereby the UK will leave both the EU and the Single Market, and then negotiate a Free Trade Agreement with the EU[152] (a position which Policy Exchange supports, as set out in our recent report, *Clean Brexit*).[153] This means that the UK will no longer have a say in the development of European product standards. However, these standards will still apply to any UK manufacturers who wish to export to the Single Market.

The UK will need to choose whether to develop its own set of product standards, continue to align with those in the EU, or follow the standards in an alternative trading block such as the US. Given the size of the UK market relative to the EU, it is unlikely that manufacturers would develop bespoke products just for the UK market. However, following Brexit, the UK will have the flexibility to choose whether to align with new European product standards, if they appear sensible, or not, if they appear onerous.

148 WRAP (2013) 'Topic Guide: Embedding environmental sustainability in product design', *Product Sustainability Forum*

149 European Commission (2016) 'Ecodesign', *European Commission Website*

150 Smithers, R. (2014) 'EU ban on powerful vacuum cleaners prompts anger and legal challenge', *The Guardian*

151 Coats, E. & Benton, D. (2016) 'Better products by design: Ensuring high standards for UK consumers', *The Green Alliance*

152 Theresa May (2017) 'The government's negotiating objectives for exiting the EU' (Speech at Lancaster House), *Gov.uk*

153 Lyons, G. & Halligan, L. (2017) 'Clean Brexit', *Policy Exchange*

Recommendations:

- **The UK should continue to engage with the EU on the development of product standards (such as the Eco-design Directive) both in the period until the UK leaves the EU, and beyond. The scope of Eco-design should be extended to consider how to improve product durability, reparability, and recyclability. The UK Government should provide clarity on whether it intends to conform to EU product standards following Brexit, or develop a UK-specific set of product standards.**

Aside from the Eco-design Directive, there are a number of other ways in which the Government can encourage the development of more sustainable products. For example, the Environmental Audit Committee recommended in 2014 that Government should encourage firms to offer longer warranties, moving their businesses towards more service-based models.[154] This would be an important step towards integrating reparability into businesses' bottom line. It may be a step too far for Government to mandate improvements in product durability, but it might be possible to achieve a similar outcome through voluntary sector-wide agreements.

The Government's Industrial Strategy green paper suggests that Government is willing to make 'deals' with sectors to improve their productivity. This could extend to include measures to boost resource productivity, such as minimising waste and incorporating recycled material into packaging or products. Sectoral agreements are already being actively pursued, with one example being the 'Dairy Roadmap.'[155] This began as the Milk Roadmap in 2008, and has since expanded in scope to include a range of sustainability commitments for both dairy producers and processors. Among these is the inclusion of 30% recycled material in high density Polyethylene (HDPE) milk bottles, and a significant reduction in waste sent to landfill. Individual companies have made similar voluntary commitment, for example, Coca-Cola has made a pledge to include 40% recycled materials in all packaging by 2020.[156]

A further development of this approach would be some form of 'kite-marking' or certification of companies or supply chains which meet specific standards for waste management, waste minimisation or recycling. Kite-marks can be helpful to ensure common standards of practice, increase transparency, and communicate benefits to consumers. Kite-marks already exist for many other environmental agendas – for example, organically certified or fairtrade foods, or Forestry Stewardship Council certified sustainable timber – but to date there have been few kite-marks developed concerning waste. The Carbon Trust recently launched a new "Zero Waste to Landfill" standard to recognise companies that adopt best practice approaches to waste management.[157]

Recommendations:

- **As part of the broader sector-based approach set out in the Industry Strategy green paper, Government and industry should work to improve resource productivity and reduce waste.**
- **The wider use of kite-marking should be explored as a way to communicate the advantages of better product design to the consumer.**

154 House of Commons Environmental Audit Committee (2014) *Growing a circular economy: Ending the throwaway society*

155 Dairy UK (2015) *Dairy Roadmap 2015*

156 Coca-Cola (2017) *'Sustainability and recycling: how Coca-Cola Great Britain is fighting waste with sustainable packaging'*

157 The Carbon Trust (2016) *Zero Waste to Landfill*

Recycling

In Chapter 3 we described how the fall in commodity prices since 2008 has led to a drop in the value of secondary materials, driving a number of recycling firms out of business, and contributing to municipal recycling rates stalling since around 2011. Chapter 3 also highlights the amount of material rejected at recycling sites due to contamination or the inclusion of 'non target' materials. These trends suggest that under current conditions, we are nearing the level of recycling which is economically and technically feasible. This section focuses on how to improve the economics of recycling by standardising recycling collection systems, improving the market for secondary materials, and unlocking innovative business models to recycle waste.

Standardising Recycling Systems

One of the key barriers to increasing the level of recycling is a lack of knowledge and awareness amongst consumers about what they can and cannot recycle. Research by WRAP found that just 26% of the population are correctly recycling all materials that their local council collects, whilst under half of households (47%) are putting at least one material in their recycling which is not intended to be collected locally.[158] Research by Viridor found that 64% of households were frustrated about not knowing what they can actually recycle, and only 49% of households feel very confident that they put different materials in the right bins.[159]

This confusion and frustration is in large part due to the complexity and inconsistency of recycling systems - it is thought that there are over 400 different systems for collecting waste and recycling across the country.[160] Two thirds of councils require households to use four or more different vessels for waste and recycling (at the extreme, households in Newcastle-under-Lyme are required to have nine different bins) whilst many Local Authorities still collect all recycling mixed together in a single vessel.[161] Collection systems for waste and recycling vary significantly even between neighbouring Local Authorities. For example, the Greatmoor facility in Buckinghamshire receives waste from seven different councils, which between them collect forty individual waste streams – only five of which are collected across all seven councils.[162]

According to the Environmental Audit Committee, the complexity and inconsistency in collection systems creates confusion for both households and waste processors, with little opportunity for standardised practice or economies of scale.[163] In a survey, 78% of households stated that they were frustrated that different councils recycle different materials, and 69% said that they would be encouraged to recycle more if the recycling system was easier and simpler to understand.[164] The complexity of recycling systems is also one of the factors which contributes towards the amount of material that recycling firms reject from recycling processes (see Chapter 3).

These issues are nothing new. Policy Exchange identified the issues concerning overly-complex waste and recycling collection systems in our 2009 report, *A Wasted Opportunity*.[165] The report made the following main recommendations about how to simplify household waste collections:

- Councils should be prevented from forcing an excessive number of bins on households
- Household collections should be standardised over time to around five or six basic collection systems.

158 WRAP (2015) *3Rs recycling knowledge, attitudes and reported behaviour survey 2015*

159 Viridor (2016) *UK Recycling Index 2016*

160 House of Commons Environmental Audit Committee (2014) *Growing a circular economy: Ending the throwaway society*

161 National House-Building Council (2015) *Time to end bin blight*

162 Grant Thornton (2016) *An ever changing landscape: Waste and resource management review*

163 House of Commons Environmental Audit Committee (2014) *Growing a circular economy: Ending the throwaway society*

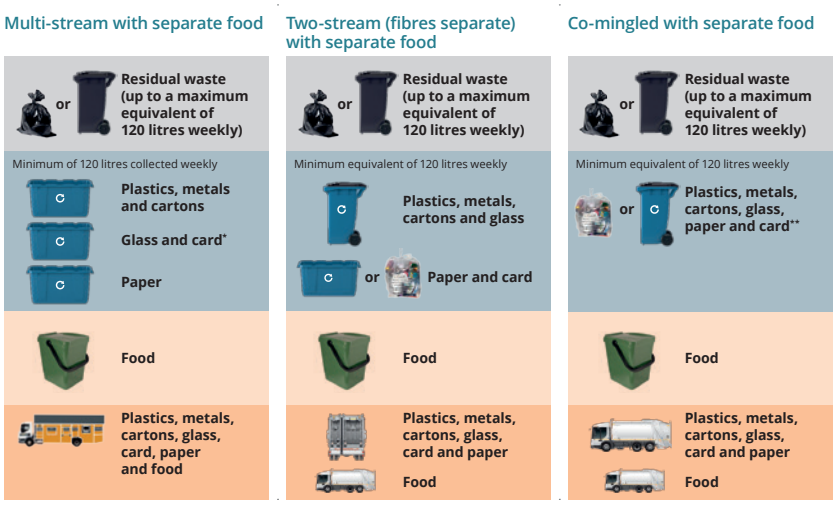
164 Viridor (2016) *UK Recycling Index 2016*

165 Coggins, C. et al (2009) *A Wasted Opportunity.* Policy Exchange

In the years immediately following the publication of our report, there was little progress made to simplify collection systems. The idea has begun to gain more traction in the last few years, particularly following the appointment of Rory Stewart as Parliamentary Under-Secretary of State at Defra in 2015. Stewart is said to have supported the idea of standardised collections, ending what he described as the "craziness" of having so many different systems.[166]

At Stewart's request, WRAP formed a group to develop a 'consistency framework' to achieve greater consistency in household waste collection systems in England. The framework was subsequently launched in September 2016.[167] Under this system, it is proposed that all councils move to one of three basic collection systems for waste and recycling. Recyclable materials would be collected either in a single container, two streams (paper and card, plus other recyclables), or a multi-stream system (in which each recycling stream is collected separately). Under all systems, food waste and residual waste would be collected separately. WRAP analysis suggests that adopting this system would increase recycling rates by seven percentage points, yield £480 million in the sales of recycled materials, and deliver savings of £400 million to Local Authorities over an eight year period.[168] Alongside this, 16 of the 32 Local Authorities in Scotland have signed a voluntary charter to establish a common collection regime, as noted in Chapter 1.

Figure 4.1: WRAP Framework for Greater Consistency in Household Waste Collection[169]



*Glass and card would be presented in the same box but separated into different compartments on the vehicle. In flatted properties card and paper could be collected together. Glass would be collected as a separate stream.
** The advice from reprocessors is that glass and paper are collected separately to maintain material quality.

The consistency framework seems to be a good step forward, and it is encouraging that all parties are working together to define a common set of arrangements. However, details remain quite vague as to when and how councils will move to the new collection systems. The consistency framework is voluntary, so it is possible that some councils will choose not to align their collection systems, undermining the policy intent.

Councils are likely to incur some initial costs in moving to one of the new collection systems. However, costs could be reduced if councils work together to

166 Holder, M. (2015) 'Stewart 'prioritises' standardized collections', *Lets Recycle Website*

167 WRAP (2016) *A framework for greater consistency in household recycling in England*

168 Ibid.

169 Ibid.

coordinate the purchases of new waste collection vehicles and related equipment. A 2015 report by the Department for Communities and Local Government estimated that councils could save 35% on the cost of bins and 10% on the cost of waste collection vehicles if purchases are coordinated, resulting in estimated cost savings of at least £70 million per annum.[170]

Recommendations:

- **Defra and DCLG should set a timetable for all Local Authorities in England to move to one of three standardised systems for the collection of waste and recycling (e.g. by 2025). Defra, DCLG and WRAP should coordinate the purchasing of new waste collection vehicles and equipment across Local Authorities in order to minimise the costs of implementation.**

Once recycling systems have been standardised, it will become far easier to tackle the lack of public understanding concerning waste and recycling. If there is clearer guidance on what can be recycled, then this will allow households to maximise the amount of 'target' materials they put out for recycling, and minimise the 'non target' materials which currently contaminate other recycling. This would increase both the quality and quantity of materials entering the recycling system, reducing costs to recycling firms and improving the viability of recycling.

Many different parties have a role in raising public awareness - including Local Authorities, the waste management companies which provide services on their behalf, national advocacy organisations such as WRAP and Zero Waste Scotland, and businesses such as retailers and product manufacturers.

Local Authorities are arguably the main focal point for interaction with households concerning waste. Research by Viridor found that the UK public generally perceive that responsibility for recycling should lie with local councils (as opposed to national government, waste companies, or other businesses).[171] Local Authorities already interact with residents on waste issues – such as advertising bin collection dates and green waste services - but the level of engagement is relatively unsophisticated.

Councils could make a number of improvements in their communications concerning waste and recycling, taking insights from behavioural economics including the use of 'nudges', as follows:

- One of the findings from behavioural economics is that people generally wish to follow common standards of behavior - following what other similar people do in their area. For example, the Behavioural Insights Team has demonstrated that including information in tax reminders to inform people that the majority of people in their area paid their tax on time, resulted in people paying early and bringing forward £210 million in revenue.[172] The energy company Opower has used similar methods to successfully reduce people's energy usage, as described in our report *Smarter, Greener, Cheaper*.[173] Informing residents about the proportion of waste that the rest of their community is recycling, or how their community is doing relative to neighbouring communities, could be a powerful tactic to improve recycling behaviour.
- People also respond well if they can see that their actions will contribute to wider community goals. Research by Viridor found that 77% of households

170 DCLG (2015) *Household Waste Collection: Procurement Savings Opportunities*

171 Viridor (2016) *UK Recycling Index 2016*

172 The Behavioural Insights team (2013) 'Behavioural Insights Tax Trials Win Civil Service Award', *Behavioural Insights Team Website*

173 Newey, G. & Moore, S. (ed) (2013) *Smarter, Greener, Cheaper.* Policy Exchange

would be encouraged to recycle more if they could see that money saved from waste services was being spent on services like schools, road repairs and social care.[174] However, it is clear that Local Authorities need to do far more to communicate what happens to waste and recycling. The same research by Viridor found that 73% of households would like more transparency on what happens to their waste, and 51% would recycle more if they had this transparency.

- Positive feedback and reinforcement can play an important role, as shown by think-tank Localis.[175] Saying 'thank-you' to households when there is a reduction in the amount of waste generated locally would be a positive interaction, potentially increasing trust in Local Authorities and the waste industry, and leading to further improvements in the way they dispose of waste.

Recommendations:

- **Local Authorities should use proactive marketing and 'nudges' to increase public awareness concerning waste and improve waste and recycling practices.**

Manufacturers and retailers can also play a significant role in improving recycling behaviour by households and businesses, given the level of interaction they have with end consumers. Basic changes could be made to improve the labelling of packaging material to encourage greater recycling. For example, due to the inconsistency of recycling systems identified above, packaging materials are currently labelled with phrases such as 'widely recycled' rather than simply saying 'recyclable'. This amplifies the confusion about what can and cannot be recycled. Packaging should be designed and labelled in order to maximise the potential for recycling to take place and to communicate this to end consumers.

Recommendations:

- **Product manufacturers and retailers should work together with WRAP to define common standards for the labelling of packaging to improve recycling behaviour.**

Developing Markets for Secondary Materials

The measures outlined above could lead to a significant increase both in the quality and quantity of materials entering the recycling system. However, boosting demand alone will only do so much to improve the economics of recycling (see Chapter 3 for discussion) and alongside this the Government needs to take additional steps to ensure that the market for secondary materials is functioning efficiently – linking buyers and sellers of waste.

One area in which Government needs to act is the market for recycled packaging materials, to remove distortions which currently put UK re-processors at an economic disadvantage. As described in Chapter 1, the UK has created an obligation for manufacturers and retailers to recycle a set proportion of the packaging materials they use, under the Producer Responsibility Obligations (2007). For every tonne of packaging waste processed, a tradable 'Packaging Recovery Note' (or PRN) is issued, which can then be traded. Revenue from the

174 Viridor (2016) *UK Recycling Index 2016*

175 Rustecki, D. (2011) *The Big Green Society.* Localis

sale of PRNs forms a significant component of the overall economics of recycling facilities. For example, PRNs for recycled paper currently trade for £1.20 per tonne, whilst the recycled paper itself sells for £15 per tonne. A PRN for recycled steel is worth £20 per tonne, compared to the price of recycled steel of £33 per tonne.

The PRN system relates to recycling and recovery activities taking place within the UK, but a similar scheme exists for packaging materials exported to other countries (which generate 'Packaging Export Recovery Notes' or PERNs). The design of these two systems is currently creating a distortion which puts UK-based recyclers at a competitive disadvantage compared to those based overseas. Under the PRN system, recyclers claim PRNs on the amount of waste they recycle after discounting any materials rejected as part of their process. However, under the PERN system, there is no adjustment for the level of contamination or rejects. This puts UK recyclers at a disadvantage, since as much as 22% of the total weight of materials handled by recyclers ends up being rejected[176] – reducing the amount of revenue that UK-based recyclers generate relative to overseas counterparts. This distortion may have contributed to the economic difficulties faced by UK-based recyclers (see Chapter 3) and the growth in exports of scrap materials from the UK (see Chapter 2).

A potential solution to this would be to adjust the number of PERNs issued to reflect the likely level of contamination and rejection of recyclates which is taking place overseas.

Recommendations:

- **Reform the system of 'Producer Recovery Notes' to remove distortions and put UK-based recyclers on an equal footing to overseas recyclers.**

Another area in which Government could intervene is to help develop markets for secondary materials to be exchanged between businesses. One example of such an intervention is the National Industrial Symbiosis Programme (NISP) - a Defra-funded programme which ran over the period 2005-2013. 'Industrial Symbiosis' is the idea that the wastes and by-products from one industry become the raw materials for another – mimicking the symbiotic relationships found in nature. NISP involved a network of over 15,000 participating businesses which coordinated to identify mutually profitable transactions for underused or undervalued resources and waste streams. For example, NISP introduced a manufacturer of insulation foam for car doors based in South Wales to a company making housing insulation. The companies formed a partnership in which the offcuts from the car door insulation business could profitably be used in the house insulation businesses. This reduced waste management costs and provided an additional revenue stream for the former business, and provided a low-cost source of materials for the latter businesses.

The NISP program as a whole generated €1.2 billion in additional sales, and cut business costs by a similar amount.[177] Over the course of the programme (2005-13) it diverted 47 million tonnes of waste from landfill, and cut greenhouse gas emissions by 42 million tonnes CO_2. An evaluation of the programme suggested that the overall economic return from the programme was between 53 and 87 times the Government investment.[178] The NISP model was identified by the OECD

176 Dow, C. (2013) 'Recycling Industry PRN/PERN Proposals Explained', *Waste Management World*

177 Laybourn, P. (2015) *Industrial Symbiosis: Delivering Resource Efficiency and Green Growth,* International Synergies

178 International Synergies (2011) 'Written Evidence to the Environmental Audit Committee', *UK Parliament*

as an "excellent example of systemic innovation vital for future green growth" and has been replicated in more than 20 countries, including European programmes funded by the European Regional Development Fund and Horizon 2020.[179]

Despite the programme's success, the Government withdrew its funding for the scheme in 2013. This was later justified by Government on the basis that "businesses need to drive change" to increase resource productivity, and that "Government's role should be focused on the areas where Government is uniquely placed to act".[180] The company which operated NISP, International Synergies, has since changed its business model to become an advisory and consulting business.[181] It has developed a software platform, SYNERGie®, which is effectively a marketplace for the exchange of waste materials between companies.[182]

Given the clear benefits demonstrated by the NISP programme, it is worth Government re-examining how it can support the development of similar markets for secondary materials in the UK. Whereas NISP was a publically funded programme, the Government could now consider alternative models such as a public-private partnership, such that the scheme is self-financing.

Recommendations:

- **Defra and WRAP should consider how to support the development of markets for secondary materials, building on the highly-successful National Industrial Symbiosis Programme which ran until 2013.**

Enabling Innovative Business Models Using Waste

One of the most important avenues to increase the UK's resource productivity is the development of new technologies and business models to either reduce resource use altogether, or find new ways to reprocess waste streams into valuable products. However, at present there are some significant barriers to this innovation taking place, in part due to specific EU and UK rules concerning waste.

One example of this is the rules concerning 'End of Waste' status. As discussed in Chapter 1, the Waste Framework Directive provides a legal definition of what is meant by 'waste' and also provides criteria for what should be considered a 'by-product' or 'End of Waste' product. End of waste products are essentially substances which have undergone a recycling or recovery process and are no longer considered waste. Granting End of Waste status relieves the holder of the resource from the various charges, taxes and regulations concerning waste disposal, and is therefore central to the business model for some waste re-processors.

The Waste Framework Directive provides a very high level definition of 'End of Waste' status, and leaves significant scope for interpretation by individual Member States.[183] This works where the Member State in question creates a clear vision for these criteria and implements them effectively, enabling innovation to take place.

In the UK, the responsibility for considering the definitions of waste falls to the Environment Agency, and their 'Definition of Waste Panel'.[184] However, as shown in the following case study concerning a company manufacturing fertiliser from waste products, the panel has done anything but enable innovation (see Box 2). The process for obtaining End of Waste status has become extremely bureaucratic, creating a significant barrier to businesses. Moreover, the Definition of Waste panel has been closed since September 2016 as a result of staff shortages at the

179 NISP (2017) 'About NISP', *NISP Website;* NISP (2014) 'NISP Media Centre', *NISP Website*

180 House of Commons Environmental Audit Committee (2014) *Growing a circular economy: Ending the throwaway society.* House of Commons

181 NISP (2014) 'NISP Joins Forces with 2degrees', *NISP Website*

182 Giotto, E. (2016) 'SYNERGie: Using Data to Identify Material Synergies', *Marketplace Hub*

183 European Commission (2008) 'Directive 2008/98/EC', *Official Journal of the European Union*

184 UK Environment Agency (2016) 'Guidance: Turn your waste into a new non-waste product or material', *Gov.uk*

Environment Agency. We understand that this is largely because the panel was expensive to run and immensely time-consuming, requiring significant amounts of lab-time for each application it received. A recent statement by the Environment Agency said that the panel's role and purpose was "under review", and "we do not have a timescale for any further updates or when the outcome of the review will be known."[185] In response to a parliamentary question on the topic it was revealed that Defra and the Environment Agency have received 12 representations from businesses and the industry press about the closure of the Definitions of Waste Panel in only three months.[186]

Box 2: Case Study on Rolawn and ProMulch

Rolawn is a company founded in 1975 which has grown to become one of Europe's largest suppliers of cultivated turf. It has a subsidiary that develops products made from recycled materials for use in sustainable horticulture and landscaping. One such product is ProMulch, a patented material that acts as an alternative for traditional peat-based composts used to enrich topsoil. It is manufactured from a waste by-product of water purification, sourced from water companies, and mixed with finely shredded straw.

ProMulch was granted End of Waste status and was sold to UK customers over the period 2010 to 2013. However, in 2013 the Environment Agency reversed its previous assessment of ProMulch, and forced Rolawn to halt manufacturing of this product. According to Rolawn this decision was made without providing sufficient justification, despite advice from Imperial College London that the product poses no additional environmental risks compared to existing industry-standard composts. The Environment Agency subsequently provided slow and unhelpful responses to enquiries.

The Environment Agency End of Waste Panel was subsequently closed on 14 September 2016 and will no longer receive applications for End of Waste status.

There are a host of UK firms developing processes to create products from waste flows – for purposes ranging from construction materials to fertilisers. While nascent technologies do need to be checked to mitigate health and environmental risks, the testing and certification regime needs to be proportionate to the risks involved. At present it appears that the process for obtaining End of Waste status from the Environment Agency has broken down altogether, acting as a blocker on further innovation. Companies may alternatively undergo a self-assessment to establish whether a product meets End of Waste status, but this leaves them open to prosecution by the Environment Agency later if they have wrongly deemed a product and they do not have the right permits in place. The Environmental Services Association has stated that "a big company making big investments would rather have confirmation by the [Environment] Agency that the material is not deemed by them to be waste".[187]

185 Preston, R. (2016) 'EA scraps definition of waste panel', MRW

186 Defra (2016) 'Waste Disposal: Written question – 57670', *UK Parliament Website*

187 The Environmentalist (2016) *Staff cuts force agency to suspend waste advice service*

Government needs to take a more positive role to promote innovation in the reuse and recycling of waste materials. This should start with a review of the definitions of waste (and End of Waste status) to remove uncertainties and grey areas. The process for obtaining End of Waste status needs to be re-established and streamlined, including a more structured system of feedback for unsuccessful applications.

Recommendations:

- **Government should foster innovation in the recycling and reuse of goods and materials. This should include re-establishing and streamlining the process for obtaining 'End of Waste' status for products manufactured from waste.**

(Energy) Recovery

The previous sections of this Chapter have shown that there is significant potential to increase waste prevention, reuse and recycling. However, there will still be waste materials which cannot technically or economically be addressed through the upper levels of the waste hierarchy. The waste hierarchy was never intended to imply that all waste should be reused or recycled, regardless of cost or practicality. As discussed in Chapter 3, it is not always economic to recycle all materials – either because they are too contaminated, or because the cost of recycling is greater than the value of the end product. On this basis, there will still be a need to deal with residual waste for the foreseeable future.

As discussed in Chapter 1, there are a number of different treatment routes to deal with residual waste, namely:

- Energy Recovery, or Energy from Waste, including a number of different technology options such as Incineration, Anaerobic Digestion, and Advanced Thermal Treatment technologies such as Gasification and Pyrolysis.
- Export of residual waste to other countries for energy recovery
- Incineration without energy recovery
- Landfilling of waste

Given the range of different options available, there is a need for Government to be clear about which of these options is preferred, and to design policies, regulations and financial incentives accordingly. The Government's current position is that it "sees a long term role for energy from waste both as a waste management tool and as a source of energy"[188] and that landfill and incineration without energy recovery "should usually be the last resort for waste."[189] This position seems sensible and is reinforced by the carbon analysis presented in Table 4.1 above, which shows that on the whole energy recovery is preferable to landfill for most materials.

In its latest position paper on Energy from Waste[190], the Government defined a set of principles to guide future policy, which again appear broadly sensible:

1. Energy from waste must support the management of waste in line with the waste hierarchy.
2. Energy from waste should seek to reduce or mitigate the environmental impacts of waste management and then seek to maximise the benefits of energy generation.

188 Defra (2014) (revised edition), *Energy from waste: A guide to the debate*

189 Defra (2013) *Waste Management Plan for England*

190 Defra (2014) (revised edition), *Energy from waste: A guide to the debate*

3. Government support for energy from waste should provide value for money and make a cost effective contribution to UK environmental objectives in the context of overall waste management and energy goals.
4. Government will remain technology neutral except where there is a clear market failure preventing a technology competing on a level footing.

Maximising the Benefits of Energy from Waste

The above principles recognise the potential tension between energy from waste and the treatment of waste further up the waste hierarchy. The Government has stated that it "supports efficient energy recovery from residual waste of materials which cannot be reused or recycled" and that it aims to "get the most energy out of waste, not to get the most waste into energy recovery." Whilst a tension clearly exists between recovery and recycling, experience from other European countries shows that they can and do co-exist. For example, in 2010, Austria achieved a 70% recycling rate (including composting) alongside 30% energy from waste; Germany achieved 62% recycling alongside 38% energy from waste; and Belgium achieved 62% recycling alongside 37% energy from waste.[191] It is notable that in these examples (subject to the definitional issues raised in Chapter 3), little or no waste is sent to landfill, with energy from waste used as the principal treatment option for residual waste.

The second and third principles set out above are about maximising the benefits of energy from waste, whilst minimising environmental impacts in line with broader UK environmental objectives. The first of these points can be considered in terms of the relative efficiency, or energy output, of each of the various Energy from Waste technologies (Table 4.3). Standard electricity-only incinerators have a relatively low efficiency of 15-27% (i.e. the electricity produced represents 15-27% of the total Calorific Value of the feedstock incinerated). If an incinerator is also fitted with heat recovery, then the overall efficiency is substantially increased to 40%+. The efficiency of Anaerobic Digestion depends on how the energy is used – AD facilities which produce only electricity are relatively inefficient, whilst those injecting gas into the grid are far more efficient.

A similar pattern is true for advanced energy from waste technologies such as Gasification, in which waste is gasified to produce synthetic natural gas (referred to as 'BioSNG' or 'green gas'). This gas can either be burned on site to produce electricity, in which case the efficiency is similar to that of an incinerator, or injected directly into the gas grid, in which case the efficiency is far higher at around 60%. Box 3 provides further details about the current status of Gasification technologies.

Table 4.3: Efficiency of Energy from Waste Technologies[192]

Technology	Energy output	Efficiency (total usable energy divided by Calorific Value of feedstock)
Incineration	Electricity only	15-27%
	Combined Heat and Power	40%+
Anaerobic Digestion	Combined Heat and Power	33-41%
	Gas grid injection	53%
Gasification	Electricity only	10-30%
	Gas grid injection	59%

191 Defra (2014) (revised edition), *Energy from waste: A guide to the debate*

192 CIWEM (2016) *Policy Position Paper: Energy Recovery from Waste;* National Grid Gas Distribution (2015) *Commercial BioSNG Demonstration Plant, RIIO NIC Project Summary.* Ofgem; Defra (2014) *Energy from waste: A guide to the debate;* KM Enviros (2011) *Analysis Of Characteristics and Growth Assumptions Regarding AD Biogas Combustion for Heat, Electricity and Transport and Biomethane Production and Injection to the Grid;* Defra (2013) *Advanced Thermal Treatment of Municipal Solid Waste;* Authors own calculations.

Box 3: Advanced Thermal Treatment (Gasification and Pyrolysis)[193]

Advanced Thermal Treatment refers to a number of innovative technologies such as Gasification and Pyrolysis, which can be used to generate energy from waste. These technologies break down waste at high temperatures into a gaseous form, which can then be further refined to produce methane. The end product is often referred to as Synthetic Natural Gas or BioSNG. This can then either be burned to produce power (and possibly heat) or injected into the gas grid.

Gasification and Pyrolysis are well established technologies, but there is limited track record to date in applying this technology to mixed waste. The focus of development to date has been on facilities producing power only (which as shown above are relatively inefficient). There are currently only two operational large scale gasification projects in UK, at Oldbury and Avonmouth, taking a total of 300,000 tonnes of waste per year. A further 10 projects are under construction, which when built will increase total capacity to 1.8 million tonnes of waste per year, and produce 200 MWs of electrical output. Beyond this there is also a significant pipeline of projects with planning consent, totalling 5.5 million tonnes of waste capacity per year, or 600MWs of electrical output.

Gasification with grid gas injection is a less mature technology, but has the potential to offer much higher levels of efficiency (see Table 4.3). A demonstration project is being developed by National Grid, Advanced Plasma Power, and Progressive Energy in Swindon, which will produce 22 GWhs of gas from 7,500 tonnes of waste each year. The developers claim that the cost of the technology could reduce substantially as it becomes mature and is scaled up to a full scale commercial facility, and that it could be viable without any subsidy support by the mid 2020s (based on gate fees and revenues from sales of gas).

Gasification projects are held back by a number of barriers, including perceived technology risk, and risks concerning the supply of feedstock. This has not been helped by the failure of a number of early projects, such as the Tees Valley gasification facility, in which an investment of £630-700 million was reportedly written off due to performance issues. However, Gasification and Pyrolysis projects have some benefits over incinerators, particularly in terms of planning. They are generally smaller scale than incinerators, leading to less community opposition. The technology is generally perceived to be cleaner, hence the barrier to obtain planning permission is lower than for technologies such as incinerators.

193 Eunomia (2016) *Investment in Advanced Conversion Technologies: Has the time finally arrived?;* National Grid Gas Distribution (2015) *Commercial BioSNG Demonstration Plant, RIIO NIC Project Summary.* Ofgem

The overall pattern shown in Table 4.3 is that the highest efficiencies are achieved by energy from waste technologies which produce gas and inject this into the gas grid. Technologies that generate both heat and power are also relatively efficient, whilst facilities producing electricity only represent a very inefficient way of generating energy from waste.

As well as considering the efficiency of Energy from Waste technologies, it is also worth considering the contribution they can make towards the UK's decarbonisation objectives. The UK has a finite amount of waste available for energy recovery, and therefore it is sensible to think about the best use of this waste – specifically whether the waste should be used to generate power, heat or gas.

A recent Policy Exchange report, *Too Hot To Handle?*[194], showed that the UK is already making significant progress to decarbonise power generation, but far less progress in decarbonising heating and transport. Technologies such as Gasification and Anaerobic Digestion offer a route to decarbonise heating and transport through the production of biogases (biomethane and BioSNG). Technologies which capture heat and distribute it to users through heat networks could also play a significant role in decarbonising heating. On this basis, these technologies are more 'useful' than other technologies which only produce electricity from waste, where there are more low carbon substitutes (e.g. wind, solar, nuclear).

Recommendations:

- **Government should prioritise energy from waste towards high efficiency technologies (producing 'green gas' or Combined Heat and Power). These technologies offer far higher levels of efficiency than electricity-only energy from waste facilities and could play an important role in decarbonising heating and transport.**

In practice, this means that Government will need to limit the development of low efficiency energy from waste projects going forward. Under European rules, energy from waste facilities are classified either as high efficiency "recovery" facilities (referred to as R1 facilities) or low efficiency disposal facilities (D10 facilities). This is a voluntary system, in that operators choose whether or not to register their sites. The UK Government has been rather circumspect about the number of UK energy from waste facilities achieving R1 status. Government has released data on the number of R1 facilities, but only as a result of Freedom of Information requests. As of November 2015, there were 23 energy from waste facilities with R1 status, although Defra has suggested that there may be a further 29 facilities in England that could qualify for R1 status but have not yet applied.[195]

Recommendations:

- **In line with Defra's general drive towards improving data access and transparency, it should regularly publish a register of all energy from waste facilities in the UK, identifying whether or not they have achieved R1 status for high levels of efficiency.**

194 Howard, R. and Bengherbi, Z. (2016) *Too Hot to Handle?* Policy Exchange

195 Goulding, T. (2016) '2015 sees increase in EfWs awarded 'recovery' status', *Lets Recycle Website*

The Government has stated that it wishes to "remain technology neutral" with regard to Energy from Waste technologies. However, the reality is that the current policy framework is far from technology neutral. The Government has established a number of different subsidy schemes to provide financial support to Energy from Waste and low carbon energy technologies – including the Contract for Difference, Renewable Heat Incentive, and the small–scale Feed in Tariff. The eligibility requirements and tariffs for individual Energy from Waste technologies vary considerably across these schemes. Technologies are offered differential levels of support based on their relative costs, not based on their relative efficiency or environmental impact (Table 4.4).

Table 4.4: Subsidies available for Energy from Waste Technologies[196]

	Energy output	Contract for Difference (net subsidy)[197]	Non-Domestic Renewable Heat Incentive	Small Scale Feed in Tariff
Incineration	Electricity only	Not eligible	Not eligible	Not eligible
	CHP	£37/MWh	£8-52/MWh[198]	Not eligible
Anaerobic Digestion	Electricity/CHP	£100/MWh (electricity output only)	£10-33/MWh (heat output only)[199]	£25-69/MWh[200] (electricity output only)
	Gas grid injection	Not eligible	£18-39/MWh[201]	Not eligible
Gasification	Electricity only	£84/MWh	Not eligible	Not eligible
	Gas grid injection	Not eligible	£18-39/MWh[202]	Not eligible

196 Note: the subsidy relates to the biogenic component of waste only.

197 The figures shown are the administrative strike price, inflated to today's money, minus the current wholesale electricity price.

198 Rates vary depending on the size of installation: £8-30/MWh for small installations (<200kW), £23-52/MWh for medium-sized installations (200kW-1MW), and £20/MWh for large installations (>1MW)

199 The highest rate of £33/MWh applies to small scale installations under 200 kWth; a rate of £26/MWh applies to installations in the range 200-600 kWth,; and a rate of £10/MWh

200 Generation tariff for AD facilities accrediting from April 2017 onwards

201 The highest rate of £39/MWh applies to the first 40,000 MWh of biomethane production, a second rate of £23/MWh applies to the next 40,000 MWh of production, and £18/MWh thereafter.

202 Ibid.

203 BEIS (2016) *Call for Evidence – Contracts for Difference: A call for evidence on fuelled and geothermal technologies in the Contracts*

It is notable that the subsidies available for biomethane injection (under the RHI) are considerably lower than for the generation of electricity from waste (under the CfD and FiT). This appears somewhat perverse, in that Government policies provide the most generous levels of support to the least efficient, and least useful energy from waste technologies (such as Anaerobic Digestion and Gasification facilities producing electricity only).

Recommendations:

- **Government needs to re-orientate the financial incentives for energy from waste in order to meet its own objectives of getting the most energy out of residual waste. The focus should shift away from 'electricity only' projects to projects capturing both heat and power, or converting waste into biogases.**

Government has already made steps towards this position. In a recent Call for Evidence[203], the Government proposed that in the next Contract for Difference auction, the support to "fuelled technologies" (such as Incineration, Gasification, and Anaerobic Digestion projects producing electricity) should be capped. The proposed cap is set at a maximum of £70 million out of the £290 million budget, or 150MW of capacity.

There is some uncertainty about how these projects will fare in the forthcoming CfD auction in any case. Government figures suggest that these technologies are more expensive than competing technologies such as offshore wind;[204] but a recent report by Eunomia (a waste consultancy) came to the opposite view.[205]

The Renewable Heat Incentive (RHI) provides support to Gasification and Anaerobic Digestion facilities for the provision of heat and/or the injection of biomethane into the grid. Government recently made a number of useful changes to the RHI such as offering "tariff guarantees" for projects in development, and slightly increasing the tariff for biomethane injection.[206] However, there are still a number of issues with the design of the RHI (some of which we highlighted in our recent report *Too Hot to Handle?*):

- The RHI scheme offers some very generous subsidies to expensive technologies such as Ground Source Heat Pumps, whilst limiting support for more cost-effective technologies such as biomethane injection. **We recommend that the Government focuses remaining support under the RHI on the most cost-effective technologies such as biomethane injection, and caps support for the most expensive technologies.**
- At present, support under the RHI is limited to energy from waste facilities using Municipal Solid Waste as a feedstock, and only to the proportion of waste feedstock which is deemed to be 'renewable'. It is unclear why support is limited to Municipal Solid Waste, given that this represents a small proportion of overall waste arisings (as shown in Chapter 2). **Government should consider extending support to energy generation from all sources of residual waste.**
- Finally, there is a need for Government to provide long-term certainty about the future of the Renewable Heat Incentive. At present, funding for the scheme is only committed until 2020/21[207], creating uncertainty for developers and investors. This is problematic for new technologies such as Gasification, which is still at an early stage of commercial rollout, but is expected to be fully commercialised during the 2020s. **Government should provide clarity about the future of the RHI to at least the mid 2020s.**

Increasing Community Support

As set out above, the Government's position is that it is generally supportive of generating energy from residual waste, provided that the environmental impacts of doing so are minimised, and the energy outputs are maximised. However, some energy from waste projects have faced strong opposition by local communities. For example, the approval rate for incineration projects submitted for planning since 1990 is just 63%.[208] This is lower than the approval rate for offshore wind (88%), hydro (84%), or solar projects (75%). Energy from waste projects also tend to face a protracted process to obtain planning approval. For example, it takes an average of 14 months for an incinerator project to gain planning permission.[209] This is far longer than the statutory target of 13 weeks for determination of applications for major developments, and somewhat longer than the 11 month average planning period for renewable energy projects.[210] Some incinerator projects have taken far longer to gain planning consent; for example, it took nearly 7 years for the Riverside Incinerator in Kent to obtain planning approval.[211]

204 BEIS (2016) *Electricity Generation Costs*

205 Eunomia (2016) *Investment in Advanced Conversion Technologies: Has the time finally arrived?*

206 BEIS (2016) *The Renewable Heat Incentive: A Reformed Scheme*

207 DECC (2016) *The Renewable Heat Incentive: A reformed and refocused scheme*

208 BEIS (2016) Renewable Energy Planning Database. N.B: This database Includes all projects submitted for planning since 1990, excluding those still awaiting a planning determination.

209 Ibid.

210 Ibid.

211 Ibid.

This is a classic 'NIMBY' problem, in that the population in general is broadly supportive of energy from waste as a technology, but fewer people want facilities to be built in their area. Research by Suez Environment shows that 79% of people think that energy from waste is a good idea in general.[212] This is greater than the level of support expressed for other renewable technologies such as offshore wind (75% of people are supportive), onshore wind (71%), or biomass (64%).[213] Separate research by Viridor showed that 85% of people think that waste which cannot be recycled should be used to create energy, and that 85% of people would rather waste is used to create energy than disposed of in landfill.[214] However, people are far less supportive of having a waste treatment facility built in their local area (58% support, 23% oppose).[215]

The lack of enthusiasm towards energy from waste facilities generally stems from concerns over their environmental impact. The main environmental objections raised are: visual impact, transport impacts associated with the movements of materials to and from the site, and emissions.[216] Visual impacts can be mitigated to an extent through decisions over the location and design of the facility (notwithstanding the fact that energy from waste facilities can be large pieces of infrastructure). Transport impacts can also be mitigated through the choice of location, the shipment of materials by rail, and/or through improvements to local road infrastructure.

As shown in Chapter 2, the environmental impacts associated with incinerators have improved substantially in recent years. Incinerators are operating well within the required Emission Limit Values for regulated pollutants, and emissions of dioxins and heavy metals have fallen substantially. On this basis, the Government's Waste Strategy for England (2007) concluded that "research carried out to date shows no credible evidence of adverse health outcomes for those living near incinerators."[217] More recently, Public Health England stated that "modern, well-managed incinerators make only a small contribution to local concentrations of air pollutants" and consequently the health impacts of incinerators are "likely to be very small and not detectable."[218]

However, a great deal more needs to be done to convey this message to the general public, to avoid the objections and planning delays that have beset many projects. The waste industry is not particularly transparent about the emissions from energy from waste facilities, despite the seemingly strong track record. In putting together Figure 2.13 above, we found very little information in the public domain about actual emissions from energy from waste facilities. Improving data transparency would help to reinforce the message that energy from waste facilities do not pose a risk to health, are preferable to landfill, and can therefore play an important role in the waste hierarchy. This would serve to reassure those who have concerns about the environmental effects of energy from waste facilities such as incinerators and improve decision-making.

Recommendations:

- **The Government and waste management industry should work together to increase transparency about the environmental impact of energy from waste facilities. Ideally this information should be collected from all operators in a central, publically accessible database identifiable on a site by site basis. This could be included as part of the National Atmospheric Emissions Inventory.**

212 SITA (2011) *Public Attitudes to Community Buy-In For Waste and Resource Infrastructure*

213 BEIS (2016) *Public Attitudes Tracker: Wave 19*

214 Viridor (2016) *UK Recycling Index 2016*

215 SITA (2011) *Public Attitudes to Community Buy-In For Waste and Resource Infrastructure*

216 Defra (2014) (revised edition), *Energy from waste: A guide to the debate*

217 Defra (2007) *Waste Strategy for England 2007*

218 Defra (2014) (revised edition), *Energy from waste: A guide to the debate*

As with many forms of development, local residents are often resistant as they feel they face the costs of development (e.g. pollution, noise, construction traffic, visual impact) and do not receive any benefits in return. In a previous study on onshore wind, Policy Exchange considered possible solutions to the problem of community opposition, including the potential to establish community benefit schemes which provide some form of financial benefit to local residents.[219] Such an approach is now commonplace for onshore wind developments, although the level of community benefit varies from site to site. Interestingly this type of approach is not replicated for most other types of energy or waste projects.

Research by Suez Environment explored the potential to establish community benefit schemes for waste infrastructure developments. Polling revealed that 71% of people would be happy to have a waste facility built in their area, but within this, 52% of people would only support the development if they received some form of benefit (either individually or for the local community). The research tested out a number of possible mechanisms by which communities could benefit from the development of an energy from waste facility. The most popular idea was for residents living close to the facility to receive a discount on their council tax bill, and the next most popular idea was for local residents to receive a discount on their energy bill. There was also strong support for the idea of the operator establishing a community fund and providing grants to local facilities such as schools, health or leisure facilities. Community ownership of the waste facility itself was not seen as a desirable model, due to the risks involved.

Whilst these results show that community benefit schemes could be helpful in reducing community opposition, they are not widespread within the waste sector. One notable exception is landfill sites, where a Landfill Tax Communities Fund was established to support community projects close to landfill sites. However, there is nothing equivalent for energy from waste projects.

Recommendations:

- **The Government and the waste industry should explore the potential of community benefit schemes for energy from waste facilities. Government should prescribe the minimum level of community benefit (as in the case of onshore wind) but the specific form of community benefit should be agreed with communities on a case by case basis.**

Export of Residual Waste

The above sections show that there is potential for energy from waste to continue to play an important role in the management of waste in the UK. Efficient energy recovery is preferable to disposal (in carbon terms) and is able to provide energy with minimal effects on the environment or human health.

However, there is currently a gap between the amount of residual waste arising in the UK, and the capacity available to treat it. A recent report by Eunomia shows that residual waste arisings (i.e. total waste arisings minus the amount that is reused or recycled) amount to 26 million tonnes per year in the UK, yet the total energy from waste capacity amounts to only 13 million tonnes per year, leading to a 'capacity gap' of 13 million tonnes.[220] This capacity gap is met either through the landfilling of waste, or through shipments of waste (referred to as 'Refuse Derived Fuel' or RDF) to other countries for energy recovery. As described in Chapter 2, RDF exports from the UK have grown to over 3 million tonnes per annum.

219 Howard, R. and Drayson, K. (2015) *Powering Up.* Policy Exchange

220 Eunomia (2016) *Residual Waste Infrastructure Review (11th Issue)*

Policy Exchange previously held a roundtable to discuss the growth in the RDF market.[221] This noted that the growth in waste exports was being driven by a combination of policy, planning, and market factors. The progressive increase in the Landfill Tax (see Figure 1.2) has created a strong financial incentive to pursue alternative recovery and disposal options. At the same time, planning restrictions have held back the development of energy from waste facilities in the UK (as discussed above). Continental Europe currently has an excess of energy from waste capacity, which has made it attractive for operators to export waste as an economic alternative to landfilling in the UK. Waste operators are able to price RDF exports just below the cost of energy recovery or landfill in the UK (see Chapter 2).

Going forward, the 'capacity gap' is expected to close substantially by 2020, as more energy from waste facilities are built in the UK, although there is some uncertainty about exactly when this will happen. A report by Eunomia shows that if recycling rates continue to increase in line with the EU Circular Economy package, and new energy from waste facilities are delivered as expected, then the residual waste capacity gap could close entirely by 2023/24.[222] This will mean that both landfilling of waste and RDF exports could reduce to zero. However, the same report shows an alternative scenario in which residual waste arisings remain constant, RDF exports increase to 3.5 million tonnes per annum, and the capacity gap persists until at least 2030. Central to the analysis is the assumption made on the level of recycling in the UK, and the extent to which this increases in the future.

Alongside this, there is some discussion about whether the UK should take a more interventionist approach to limit RDF exports. The Waste Framework Directive (2008) promotes the principles of self-sufficiency and proximity in waste treatment, both for individual Member States, and for Europe as a whole. Defra has previously expressed support for energy recovery to take place within the UK "to ensure that the UK benefits from the energy generated from UK waste", and has a policy of self-sufficiency in waste disposal.[223]

Exporting waste as RDF is a real cost to the UK economy – which we estimate to be in the region of £280 million per year (see Chapter 2). However, the environmental case for or against RDF exports is more nuanced. The exporting of waste implies additional emissions associated with transportation, but energy from waste facilities in Continental Europe are generally more efficient than those in the UK, since they typically capture both heat and power. This means that the overall environmental impacts of RDF export may be lower than an electricity-only incinerator in the UK.

That said, the Environment Agency could do more to ensure that RDF exports are legitimate. The current definition of Refuse Derived Fuel is simply waste that has undergone some form of pre-treatment, and the operator has a contract in place to supply RDF to an end-user. In reality, the level of processing may be very limited – for example, the waste could simply be shredded and balled for shipment and still be considered to be RDF.

Recommendations:

- **We urge Government not to intervene to limit exports of Refuse Derived Fuel. This performs a legitimate role as part of the waste hierarchy. However, in line with our overarching recommendation to maximise the value of waste, we suggest that Government should tighten regulations concerning the definition of "Refuse Derived Fuel", such that operators are required to extract all economically-recoverable materials prior to export.**

221 Newey, G. (2013) *Wasting Waste.* Policy Exchange

222 Eunomia (2016) *Residual Waste Infrastructure Review (11th Issue)*

223 DEFRA (2014) *Energy from waste: A guide to the debate (revised edition)*

Appendix 1: Data Tables to Accompany Charts

Table A1.2: UK Landfill Tax (£ per tonne)[224]

Year	Standard Rate (Active Waste)	Reduced Rate (Inactive Waste)
1996/1997	£7.00	£2.00
1997/1998	£7.00	£2.00
1998/1999	£7.00	£2.00
1999/2000	£10.00	£2.00
2000/2001	£11.00	£2.00
2001/2002	£12.00	£2.00
2002/2003	£13.00	£2.00
2003/2004	£14.00	£2.00
2004/2005	£15.00	£2.00
2005/2006	£18.00	£2.00
2006/2007	£21.00	£2.00
2007/2008	£24.00	£2.00
2008/2009	£32.00	£2.50
2009/2010	£40.00	£2.50
2010/2011	£48.00	£2.50
2011/2012	£56.00	£2.50
2012/2013	£64.00	£2.50
2013/2014	£72.00	£2.50
2014/2015	£80.00	£2.50
2015/2016	£82.60	£2.60
2016/2017	£84.40	£2.65

224 IFS (2015) *Landfill Tax Data*

225 Eurostat (2017) *Resource Productivity Statistics*

226 Defra (2016) *UK Statistics on Waste*

227 Eurostat (2017) *Generation of waste by waste category, hazardousness and NACE Rev. 2 activity*

Table A2.1: GDP per Unit of Domestic Material Consumption (Euros per Kg)[225]

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
EU (28 countries)	1.48	1.50	1.54	1.57	1.54	1.56	1.58	1.58	1.60	1.73	1.82	1.78	1.91	1.96	1.97	2.00
United Kingdom	2.12	2.16	2.28	2.36	2.32	2.46	2.55	2.63	2.78	3.03	3.18	3.20	3.35	3.37	3.37	3.46

Table A2.2 & A2.3: Waste Generated by Sector (Million Tonnes)[226 227]

	Agriculture, Forestry & Fishing	Mining & Quarrying	Manufacturing	Utilities (energy, water)	Waste industry	Construction	Services (except waste, utilities)	Households	Total
2004	0.7	35.1	35.1	8.5	50.1	99.2	39.1	31.0	298.8
2006	0.7	31.8	28.2	8.7	38.8	109.6	41.1	32.5	291.2
2008	0.7	34.1	22.8	6.5	46.0	101.0	39.6	31.5	282.2
2010	0.5	24.8	12.3	5.1	35.1	102.2	28.0	28.6	236.6
2012	0.7	24.0	13.6	6.4	41.1	100.2	27.5	27.5	241.1
2014	0.7	26.3	82.5	4.6	48.3	120.4	15.6	27.7	251.8

Table A2.4: Municipal Waste in England (Thousand Tonnes)[228]

	2000/01	...	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Landfill	22,039	...	17,873	16,890	15,513	13,784	12,490	11,391	9,568	8,514	7,933	6,361	5,133
Incineration with EfW	2,391	...	2,853	3,231	3,163	3,325	3,610	3,975	4,878	5,500	6,204	7,773	9,059
Incineration without EfW	20	...	6	6	5	6	6	5	4	4	41	25	192
Recycling	3,446	...	7,799	8,937	9,703	10,082	10,275	10,588	10,712	10,577	10,931	11,067	11,073
Other	162	...	195	122	121	198	255	356	436	526	537	589	668
Total	**28,057**	**...**	**28,726**	**29,187**	**28,507**	**27,395**	**26,636**	**26,314**	**25,599**	**25,120**	**25,645**	**25,816**	**26,124**

Table A2.6: Household Recycling Rates in the UK[229]

	UK	England	NI	Scotland	Wales
2010	40.4%	41.2%	38.0%	32.5%	44.0%
2011	42.9%	43.3%	40.4%	37.1%	49.0%
2012	43.9%	44.1%	41.7%	38.3%	52.1%
2013	44.1%	44.2%	42.9%	39.6%	52.6%
2014	44.9%	44.8%	43.6%	41.0%	54.8%
2015	44.3%	43.9%	42.0%	42.0%	55.8%

228 Defra (2016) ENV18 - *Local authority collected waste: annual results tables*

229 Defra (2016) *UK Statistics on Waste*

Table A2.7: Municipal Waste by Treatment Route (Kg per Capita, 2014)[230]

Country	Recycling / Composting	Energy Recovery (R1)	Landfill / Disposal	Total
Austria	319	206	23	548
Belgium	240	190	10	440
Bulgaria	102	7	307	416
Croatia	64	1	309	374
Cyprus	109	5	467	581
Czech Republic	79	57	174	310
Denmark	336	412	10	758
Estonia	112	169	23	304
Finland	157	241	84	482
France	199	173	137	509
Germany	394	143	81	618
Hungary	118	38	221	377
Italy	207	94	154	455
Latvia	67	0	258	325
Lithuania	132	38	255	425
Luxembourg	288	217	110	615
Malta	64	2	478	544
Netherlands	268	245	14	527
Poland	87	31	153	271
Portugal	138	94	222	454
Romania	33	7	179	219
Slovakia	33	34	215	282
Slovenia	156	1	101	258
Spain	142	54	240	436
Sweden	218	217	3	438
UK	211	126	136	473
EU28	206	113	146	465

230 European Commission (2017)
Municipal waste by waste operations

Table A2.8: UK Trade in Scrap Materials, by Value (£ Billion)[231]

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016 (est)
All Exports	0.55	0.64	0.77	1.12	1.63	1.90	2.36	2.76	3.55	2.98	4.21	5.06	4.75	4.16	4.02	3.73	3.94
All Imports	0.13	0.10	0.10	0.08	0.09	0.10	0.14	0.20	0.19	0.12	0.26	0.29	0.31	0.49	0.57	0.71	0.88
All Net	0.41	0.54	0.67	1.09	1.54	1.80	2.22	2.56	3.36	2.86	3.95	4.77	4.44	3.67	3.44	3.02	3.06

Table A2.9: UK Trade in Scrap Materials, by Weight (Million Tonnes)[232]

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016 (est)
All Exports	2.94	3.66	5.13	8.33	11.5	12.26	14.67	15.70	17.30	17.33	17.30	18.35	18.49	17.52	18.60	19.41	21.10
All Imports	0.16	0.22	0.22	0.17	0.14	0.16	0.18	0.17	0.28	0.30	0.69	1.06	1.53	3.22	3.99	5.02	6.28
All Net	2.78	3.44	4.91	8.16	11.36	12.10	14.48	15.52	17.02	17.02	16.62	17.29	16.96	14.30	14.61	14.40	14.82

Table A2.10: Trend in UK Exports of Refuse Derived Fuel (Million Tonnes)[233]

	2010	2011	2012	2013	2014	2015	2016
Total Exports of RDF/SDF	0.01	0.25	0.96	1.80	2.37	2.82	3.21

231 HMRC (2017) *Data Tables: UK Imports and Exports by Commodity Code*. UK Trade Info

232 Ibid.

233 Defra (2016) *International Waste Shipments Exported from England 2010-2016*

234 Ibid.

235 Committee on Climate Change (2016) *Meeting Carbon Budgets – 2016 Progress Report to Parliament*

Table A2.11: Destination of UK Exports of Refuse Derived Fuel (Jan. 2016 – Oct. 2016)[234]

Country	Tonnes	Percentage of UK Total
Netherlands	1,244,352	46%
Germany	575,972	21%
Sweden	337,452	13%
Denmark	161,737	6%
Norway	80,349	3%
Latvia	57,433	2%
Belgium	46,044	2%
Other	97,455	4%

Table A2.12: UK Greenhouse Gas Emissions by Sector (Mt CO_2e)[235]

	1990	...	1995	...	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Power	204	...	164	...	159	169	165	174	174	173	183	178	173	152	158	145	159	148	124	102
Industry	219	...	204	...	181	175	166	165	164	163	155	154	142	124	127	118	115	117	114	113
Transport	122	...	122	...	127	127	129	128	130	130	131	132	127	122	120	118	118	117	118	120
Buildings	106	...	108	...	113	116	108	110	112	108	103	98	106	99	110	89	99	100	84	88
Agriculture & LULUCF	59	...	58	...	52	49	48	48	47	45	44	42	41	41	41	40	39	39	40	40
Waste	69	...	71	...	66	64	63	60	55	52	49	45	40	34	29	26	24	20	18	18
F-gases	18	...	21	...	13	13	14	15	14	15	16	16	16	17	18	16	17	17	17	17

Table A2.13: Emissions from Energy from Waste Facilities

	Dust (Particulates) mg/m³	Total Organic Carbon mg/m³	Hydrogen Chloride mg/m³	Carbon Monoxide mg/m³	Sulphur Dioxide mg/m³	Oxides of Nitrogen mg/m³
Limit Value	**10**	**10**	**10**	**50**	**50**	**200**
Plant 1	1 (7%)	1 (10%)	7 (71%)	7 (14%)	16 (33%)	178 (89%)
Plant 2	1 (9%)	0 (3%)	6 (64%)	6 (12%)	16 (32%)	179 (90%)
Plant 3	3 (33%)	0 (5%)	9 (86%)	5 (10%)	3 (7%)	154 (77%)

Note: Figures in parenthesis indicate the actual emissions as a proportion of the limit value

Table A3.1 & A3.2: Cost-Benefit Analysis of Options for the Circular Economy Package (€ billions)[236]

	EU28			UK		
	Direct cost/benefit	External cost/benefit	Net social cost/benefit	Direct cost/benefit	External cost/benefit	Net social cost/benefit
Option 3.8a	11.0	25.7	36.7	-0.8	4.0	3.2
Option 3.8b	14.9	31.1	46.1	-0.3	4.9	4.7
Option 3.8c	5.1	27.8	32.9	-2.2	4.3	2.2
Option 3.9a	8.6	18.0	26.7	-0.0	2.4	2.4
Option 3.9b	10.2	22.7	32.9	-0.4	3.4	3.0
Option 3.9c	4.9	19.6	24.5	-0.8	2.8	2.0
Option 3.9d	4.0	25.8	29.7	-1.8	4.1	2.3

236 European Commission (2015) 'Commission Staff Working Document: Additional analysis to complement the impact assessment at SWD (2014) 208 supporting the review of EU waste management targets', *European Commission Document Archive*

Table A3.3: Index of Real Commodity Prices (2008=100)[237]

Series	2008	2009	2010	2011	2012	2013	2014	2015
Aluminium	100	69	87	88	75	70	70	63
Coal	100	60	80	90	72	65	54	44
Copper	100	79	111	120	109	102	96	77
Crude oil	100	68	84	107	110	108	98	52
Iron ore	100	55	96	102	79	84	60	35
Lead	100	88	106	108	94	99	97	83
Natural gas	100	69	64	74	82	85	73	53
Platinum	100	81	105	103	94	92	85	65
Rubber	100	79	145	176	125	105	73	59
Tin	100	78	113	133	109	117	115	84
Zinc	100	94	119	110	99	99	112	100

Table A3.4: Indexed Price of Secondary Recycled Materials (2010=100)[238]

	2010	2011	2012	2013	2014	2015	2016
Clear Glass	100	90	103	121	87	64	58
Aluminium cans (baled or densified and strapped)	100	122	103	99	88	90	92
Steel cans (excluding delivery)	100	114	106	111	97	46	30
Plastic bottles (Clear and light blue PET)	100	143	112	100	83	52	46
Mixed papers	100	138	91	84	73	72	96

237 World Bank (2017) *World DataBank: Global Economic Monitor (GEM) Commodities*

238 Lets Recycle (2017) *Recyclate Price Data*

This report considers the future of waste policy following Brexit. It provides a summary and critique of European and UK policies towards waste and resource management, highlighting both the successes to date and the weaknesses.

Successive European Directives concerning waste and recycling have led to a step change in the way that we manage waste in the UK – with less waste going to landfill, and more being recycled. However it is becoming less and less clear what European waste policies are trying to achieve: the objectives are muddled, and the proposed recycling targets are badly designed. The European Commission's own analysis shows that adopting the policies they are now proposing would place additional costs on UK businesses and households.

Brexit offers an opportunity for the UK to reconsider waste policy in the light of its new competence in this area, and identify the best way forward. This report recommends that rather than adopting the EU's proposed "Circular Economy package", the UK Government should develop its own set of policies concerning waste and resources. This should be reframed around a much clearer set of objectives and policies, aimed at improving the UK's resource productivity whilst minimising the environmental impacts associated with waste.

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